BID PACKAGE

CUYAHOGA COUNTY
DEPARTMENT OF PUBLIC WORKS

HIGHWAY CONSTRUCTION

CUY-OLD ROCKSIDE ROAD
REPLACEMENT OF EXISTING BRIDGE 00.42
OVER THE CUYAHOGA RIVER
IN THE CITY OF INDEPENDENCE
AND VILLAGE OF VALLEY VIEW

PID No. 91563
FAN E120(225)

DBE GOAL TBD %

CONTENTS:

1) PROPOSAL PACKAGE

2) CUYAHOGA COUNTY ENGINEER SPECIFICATION BOOKLET

3) PLANS

4) STANDARD CONSTRUCTION DRAWINGS

PROPOSAL PACKAGE

CUYAHOGA COUNTY
DEPARTMENT OF PUBLIC WORKS

HIGHWAY CONSTRUCTION

CUY-OLD ROCKSIDE ROAD
REPLACEMENT OF EXISTING BRIDGE 00.42
OVER THE CUYAHOGA RIVER
IN THE CITY OF INDEPENDENCE
AND VILLAGE OF VALLEY VIEW

COUNTY REQUISITION NUMBER RQ-7877

BID DUE DATE: DATE
(BIDS DUE AT 2:00 PM LOCAL TIME)

DBE GOAL TBD %

PROPOSALS MUST BE SEALED AND ADDRESSED TO:

DEPARTMENT OF PURCHASING
2079 EAST 9TH STREET, 2ND FLOOR
CLEVELAND, OHIO 44115

PLANS AND SPECIFICATIONS PREPARED BY:

BURGESS & NIPLE
FOR THE
CUYAHOGA COUNTY DEPARTMENT OF PUBLIC WORKS

CATHERINE H. TKACHYK
INTERIM DIRECTOR, DEPARTMENT OF PURCHASING

ANDRIA RICHARDSON
CLERK OF COUNCIL

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SECTION 1

LEGAL NOTICE TO BIDDERS

Sealed Proposals will be received for furnishing all labor, materials, and equipment necessary for the following project:

Project Name: **CUY-OLD ROCKSIDE ROAD REPLACEMENT OF EXISTING BRIDGE 00.42 OVER THE CUYAHOGA RIVER IN THE CITY OF INDEPENDENCE AND VILLAGE OF VALLEY VIEW, PID No. 91563, FAN E120(225)**

Total Estimated Cost: $ 6,600,000.00

Bid Due Date: **DATE** **Requisition No.** **7877**

Proposals must be in accordance with the plans and specifications prepared by the Cuyahoga County Department of Public Works and on file at the Department of Purchasing, 2079 East 9th Street, 2nd Floor, Cleveland, Ohio 44115.

Completed proposals must be submitted as follows:

To the Cuyahoga County Administrative Headquarters Department of Purchasing, 2079 East 9th Street, 2nd Floor, Room 2-200, Cleveland, Ohio 44115, no later than 2:00 PM (Local Time) on the bid due date, given above ("Bid Due Date"). The official closing time shall be determined by the wall clock located in the Cuyahoga County Department of Purchasing (same address). Late bids will be returned unopened.

OR

In the Cuyahoga County Supplier Portal System, no later than 2:00 PM (Local Time) on the bid due date, given above ("Bid Due Date"). The official closing time shall be determined by the Supplier Portal clock. Late bids will not be opened.

Immediately following 2:00 PM, the Proposals received will be publicly opened and read aloud at the Department of Purchasing.

Per "ODOT's LPA Template – Required Contract Provisions" (see "Section 200: Special Provisions"), only ODOT pre-qualified contractors are eligible to submit bids for this project.

Each proposal must contain the full name of the party or parties submitting the proposal and all persons interested therein. Each bidder must submit evidence of its experiences on projects of similar size and complexity. The owner intends and requires that this project be completed no later than _____, 20__.

A pre-bid meeting will be held on **_____, 20__ at __:__ AM/PM** at the Cuyahoga County Administrative Headquarters, Department of Public Works, 2079 E. 9th Street, Room _____, Cleveland, Ohio, 44115. The purpose of this meeting is to provide prospective bidders, prime contractors and subcontractors open opportunity to interact and ask questions regarding the bidding procedure and contract documents for this project. Attendance at the pre-bid meeting is strongly recommended.

The Bid Package, which includes **the Proposal Package, the Cuyahoga County Engineer Specification Booklet, the Plans, and the Standard Construction Drawings on a CD**, may be obtained at the Cuyahoga County Department of Purchasing (same address) for a non-refundable fee of **$25.00,** paid in advance. Payment shall be made by a certified check or money order drawn on some solvent account, payable to the "Treasurer of Cuyahoga County, Ohio". Personal checks or cash will not be accepted. In the event of a re-bid, the fee will be waived for all vendors on the original plan holders list, provided that the Proposal Package, the Cuyahoga County Engineer Specification Booklet, the Plans, and the Standard Construction Drawings are not revised by the County.

Contractor compliance with the equal employment opportunity requirements of Ohio Administrative Code Chapter 123, the Governor's Executive Order of 1972, and Governor's Executive Order 84-9 shall be required.

Bidders are encouraged to register in the Infor Supplier Portal, the County's Electronic Bid Submissions program and to receive notices of future bid opportunities [Phone: (216) 443-7200]. Go to https://opd.cuyahogacounty.us/ and click on the link for INFOR Supplier Portal Registration.

Prior to signing a contract with the County, contractors must be registered with the Cuyahoga County Inspector General. Registration information can be accessed on the Internet at www.inspectorgeneral.cuyahogacounty.us.

Each Bidder shall include a bid guaranty with every Proposal, per Ohio Revised Code (ORC) Section 153.54. The bid guaranty must be in the form of either a bid bond for the full amount (100%) of the Bid, or in the form of a certified check, cashier's check, or irrevocable letter of credit, per ORC Chapter 1305, in the amount of ten percent (10%) of the total amount of the Bid. If a bid bond is submitted as the bid guaranty, it must be that of an approved Surety authorized to transact business in the State of Ohio and it shall automatically increase to a 100% Performance and Payment Bond. If a certified check, cashier's check, or irrevocable letter of credit is submitted as the bid guaranty, it must be drawn on a solvent bank and made payable without condition to the Treasurer of Cuyahoga County. The County shall hold the bid bond or certified check, cashier's check, or irrevocable letter of credit as a guaranty that if the Proposal is accepted, the Bidder will enter into a Contract for same. In addition to the County, the Ohio Department of Transportation (ODOT) shall be named as an obligee in the Bidder's Performance and Payment Bond per "ODOT's LPA Template – Required Contract Provisions."

Bidders shall comply with wage rates determined by the Secretary of Labor in accordance with Federal-Aid requirements per "ODOT's LPA Template – Required Contract Provisions."

By submitting a Proposal in the manner specified in Sections 2.11(b) and (c), the Contractor agrees on behalf of the submitting business entity, its officers, employees, Subcontractors, subgrantees, agents or assigns, that all contract documents requiring County signatures may be executed by electronic means, and that the electronic signatures affixed by the County to said documents shall have the same legal effect as if that signature was manually affixed to a paper version of the document. The Contractor also agrees on behalf of the aforementioned entity and persons, to be bound by the provisions of Chapters 304 and 1306 of the Ohio Revised Code as they pertain to electronic transactions, and to comply with the electronic signature policy of Cuyahoga County.

Cuyahoga County reserves the right and discretion to reject any bid or proposal for any reason, or all bids or proposals for no reason at all, without incurring any liability.

ARMOND BUDISH
CUYAHOGA COUNTY EXECUTIVE

Published in: The Plain Dealer
Date(s): DATE

CATHERINE H. TKACHYK, INTERIM DIRECTOR
DEPARTMENT OF PURCHASING

This notice may be viewed at the following Cuyahoga County Internet site: www.opd.cuyahogacounty.us by selecting "Notices and Contracts Search." At "Select Item Type to view by" click on "Notices." Next, enter the "Notice Bid Close Date" range or "Notice Number" and select "search" to view applicable notices.

SECTION 2

INSTRUCTIONS TO BIDDERS

2.01 Definitions

The "Bid Package" includes **the Proposal Package, the Cuyahoga County Engineer Specification Booklet, the Plans, and the Standard Construction Drawings on CD**.

The "Proposal Package" includes the Legal Notice to Bidders, Instructions to Bidders, Required Bid Documents, Sample Contract Forms, and the Wage Determination Schedule.

The "Cuyahoga County Engineer Specification Booklet" includes the General Provisions, Special Provisions, Supplemental Specifications, and Proposal Notes.

All definitions set forth in the "General Provisions" of the Cuyahoga County Engineer Specification Booklet apply to the entire Bid Package.

2.02 Bidder Qualifications

All Bidders shall complete the "Work Types Worksheet" found in Section 3 of this Proposal Package. The Cuyahoga County Department of Public Works will view the "Prequalified Contractors List," found on the webpage for the ODOT Office of Contracts, in order to verify ODOT work types claimed by the Bidder. Unless the "Special Provisions" found in the Cuyahoga County Engineer Specification Booklet indicate otherwise, the "Work Type Total Dollar Amount" must be equal to or greater than 50% of the "Total Amount Bid" or the Bid will be rejected.

All Bidders must submit evidence of their experience on projects of similar complexity.

After the Proposals are opened, the Cuyahoga County Department of Public Works reserves the right to request a confidential financial statement from any Bidder. Certification by a public accountant may be required. If requested, the financial statement must provide clear evidence that the Bidder has the necessary facilities, equipment, and monetary resources to deliver materials and complete the Work in a satisfactory manner by the Completion Date.

2.03 Project Description

This project consists of the replacement of the Old Rockside Road Bridge over the Cuyahoga River, including new bridge and road, reconstruction of the approaches and construction of a temporary bridge.

2.04 Completion Date: **DATE**

(Based on an anticipated Notice to Proceed date of DATE)

2.05 Construction and Material Specifications

The Ohio Department of Transportation (ODOT) 2019 *Construction and Material Specifications* shall govern this Project, except when modified by these Plans, Special Provisions, Supplemental Specifications or Proposal Notes. Copies of the most recent *Construction and Material Specifications* may be ordered directly from ODOT. The "General Provisions" in Section 100 of the ODOT *Construction and Material Specifications* do not apply to this Project and are superseded by the "General Provisions" in Section 100 of the Cuyahoga County Engineer Specification Booklet.

Certain words found in the ODOT *Construction and Material Specifications*, "Supplemental Specifications" or "Proposal Notes" are redefined for the purpose of this contract:

i. "The State" means the County;

ii. "Department" means the County Department of Public Works;

iii. "Director" means the Cuyahoga County Director of Public Works, his/her deputies, or any engineer designated as the Director's representative;

iv. "District Construction Engineer / District Construction Administrator (DCA)" or "Engineer" means the duly authorized agent or representative of the Director, acting within his/her authority for the purposes of construction engineering and administration of the Contract;

v. "Laboratory" means any laboratory designated by the County.

2.06 Bid Guaranty

Each Bidder shall include a bid guaranty with every Proposal, per Ohio Revised Code (ORC) Section 153.54. This bid guaranty must be in the form of either a bid bond for the full amount (100%) of the Bid, or a certified check, cashier's check, or irrevocable letter of credit, per ORC Chapter 1305, in the amount of ten percent (10%) of the total amount of the Bid. If a bid bond is submitted as the bid guaranty, it must be that of an approved Surety authorized to transact business in the State of Ohio and the bid bond shall automatically increase to a 100% Performance and Payment Bond. If a certified check, cashier's check, or irrevocable letter of credit is submitted as the bid guaranty, it must be drawn on a solvent bank and be made payable without condition to the Treasurer of Cuyahoga County. The County shall hold the bid bond or certified check, cashier's check, or irrevocable letter of credit as a guaranty that if the Proposal is accepted, the Bidder will enter into a Contract for same. In addition to the County, the Ohio Department of Transportation (ODOT) shall be named as an obligee in the Bidder's Performance and Payment Bond per "ODOT's LPA Template – Required Contract Provisions".

All bid bonds must be properly executed and signed by both the Surety and the Bidder, with the names of the parties signing typed immediately below signatures, (affix corporate seal(s)). The Bidder warrants that the agent of the Surety who signed the bid bond had, prior to signing, furnished credentials to the Bidder, showing the agent's power of attorney.

2.07 Equal Economic Employment Opportunity

Bidders are prohibited from engaging in discrimination and intimidation due to race, color, religion, sex, military status, national origin, disability, age, or ancestry, per ORC Sections 4112.01 through 4112.99.

2.08 Subcontractors

Bidders shall refer to Section 108.01 of the "General Provisions" in the Cuyahoga County Engineer Specification Booklet for all regulations regarding the subletting of the Contract. The provisions of this section apply to all Subcontracts.

No Subcontractor disclosure is required as part of the Proposal.

2.09 Interpretation of the Bid Package

If upon examination of the Bid Package and the site conditions, a Bidder discovers any inconsistency, changed conditions, or error, or if a Bidder requires clarification or interpretation of the Bid Package, then the Bidder shall notify the Cuyahoga County Department of Public Works by fax transmittal/e-mail. Fax transmittals/e-mails must contain the following information:

- The Project Name, County Requisition Number and Bid Due Date;
- The Bidder's name, phone number, fax number and/or e-mail address and contact person's name;
- The inconsistency, changed condition or error discovered and/or the interpretation or clarification desired;
- References to plan sheet numbers or Bid Package page numbers.

The fax number at the Cuyahoga County Department of Public Works is 216-698-6457 and the contact person is Mary Ellen Butler. The e-mail address is mbutler@cuyahogacounty.us . No telephone calls will be accepted.

The Cuyahoga County Department of Public Works will consider the nature of the information received and evaluate the potential impacts to the competitive bidding process. If the Cuyahoga County Department of Public Works determines that their response will impact the competitive bidding process, then it will prepare an Addendum for approval and issue by the County. If the Cuyahoga County Department of Public Works determines their response does not impact the competitive bidding process, then it will not issue an Addendum, and only the Bidder submitting the fax transmittal or e-mail will receive a faxed/e-mailed response from the Cuyahoga County Department of Public Works. All information related to clarifications, interpretations or revisions of the Bid Package that has been officially communicated up to seventy-two (72) hours before the Bid Due Date will be posted on the Department of Public Works' website (http://publicworks.cuyahogacounty.us).

If a response to a Bidder's fax transmittal/e-mail is not possible within twenty-four (24) hours, then the Cuyahoga County Department of Public Works will notify the Bidder of the anticipated response date by fax/e-mail. Clarifications, interpretations, or revisions of the Bid Package made in any other manner shall not be binding, and Bidders shall not rely upon such clarifications or interpretations.

2.10 Addenda and Clarifications

Addenda and Clarifications will be e-mailed to each Bidder known by the Department of Purchasing to have purchased a complete Bid Package. If an addendum or clarification includes materials that cannot be e-mailed, then the e-mailed portion of the addendum or clarification will stipulate how such materials will be delivered to the Bidder. Paper copies of Addenda and Clarifications will be made available for inspection at the Department of Purchasing and will also be posted on the Department of Public Works' website (http://publicworks.cuyahogacounty.us) before the Bid Due Date.

Addenda issued within seventy-two (72) hours of the published time for the opening of Proposals, excluding Saturdays, Sundays, and legal holidays, will cause the Bid Due Date to be extended by seven (7) days. Clarifications have no impact to the Bid Due Date regardless of when they are issued.

Prior to submitting his/her Proposal, each Bidder shall ascertain that all issued Addenda and Clarifications have been received and shall acknowledge this receipt in the appropriate spaces provided on the "Cuyahoga County Department of Public Works Construction Proposal Form", located in Section 3.

2.11 Bidding Procedure

(a) Bid Package

Bidders shall obtain a complete Bid Package, for the fee stated in the "Legal Notice to Bidders", from the Cuyahoga County Department of Purchasing, and only from that office. Obtaining documents from any other source (e.g., from the Internet or from various construction news services) will not make the Bidder a plan holder of record. Bids received from vendors other than plan holders of record for a particular job will be deemed non-responsive. Bidders shall use a complete Bid Package in preparing Proposals. Cuyahoga County assumes **no** responsibility for Bidder's errors or misinterpretations resulting from the use of an incomplete Bid Package.

(b) Preparation of Proposals

Bidders shall submit one (1) original copy and are requested to submit one (1) electronic copy, labeled and saved on a USB drive as a PDF file, of the documents required in paragraph (c) below. All proposals submitted will become the property of Cuyahoga County and will not be returned. Any additions to or deletions from the bid forms, special notations, unauthorized alternates, or conditions not contemplated in the specifications will render the Proposal informal and unacceptable.

To complete the "Itemized Unit Price Bid Sheets" the Bidder shall enter a unit price bid in the "Unit Price Bid" column for *each item* for which there is a quantity given in the "Estimated Quantity" column, except for "Item 832 – Erosion Control", where the "Unit Price Bid" and the "Total Amount Bid" have been provided. Failure to do so will render the Proposal informal, at the discretion of Cuyahoga County.

i. To determine the total amount bid for *each item*, the Bidder shall multiply the unit price bid for *each item* against the estimated quantity given. The figure arrived at through this multiplication shall then be placed in the "Total Amount Bid" column for that item.

ii. Where the estimated quantity for an item is designated as "Lump", the Bidder shall enter his/her lump sum bid for that item in the "Unit Price Bid" column as well as in the "Total Amount Bid" column.

To determine the "Section Total", the Bidder shall add all figures in the "Total Amount Bid" column for each item in that section and the sum shall be entered on the corresponding "Section Total" line. For example, the "Section Total Roadway" is the sum of the "Total Amount Bid" column for all Roadway items. The sum of the Section Totals and the already provided "General Contingency for Unforeseen Conditions" shall be entered as the "Grand Total Bid".

When the Proposal includes "Alternate Bid Item(s)", the Bidder shall enter a "Unit Price Bid" and a "Total Amount Bid" for each "Alternate Bid Item" listed. Failure to do so will render the Proposal informal, at the discretion of Cuyahoga County.

The Bidder's "Grand Total Bid", excluding the "Alternate Bid Item(s)", shall in no case exceed the Cuyahoga County Department of Public Works' "Total Estimated Cost" by more than ten (10) percent. Any Bid that exceeds the "Total Estimated Cost" by more than ten (10) percent will be deemed informal and unacceptable.

The Bidder's Proposal must be signed with ink, by any one of the following:

i. the individual;
ii. one or more members of the partnership;
iii. one or more members or officers of each firm representing a joint venture;
iv. one or more officers of a corporation; or
v. an agent of the Bidder legally qualified and acceptable to Cuyahoga County.

If the Proposal is made by an individual, his/her name and business address must be shown; by a partnership, the name and business address of each partnership member must be shown; as a joint venture, the name and business address of each member or officer of the firms represented by the joint venture must be shown; by a corporation, the name of the state under the laws of which the corporation is chartered and the name and title of the officer or officers having authority under the bylaws to sign contracts, the name of the corporation and the business address of its corporate officials must be shown. Anyone signing a Proposal as an agent shall file legal evidence of his/her authority to do so with the Proposal.

(c) DBE Utilization Plan and DBE Affirmation

Prior to the Bid Opening, all Bidders are required to submit a DBE Utilization Plan online with ODOT in order to be eligible to bid on this project. This DBE Utilization Plan documents how the Bidder will meet the DBE contract goal by listing which DBE firms (and which Good Faith Efforts, if necessary) are intended to be used by the Bidder. The DBE Utilization Plan shall be submitted online at the following location:

https://odot.formstack.com/forms/dbe_copy .

After the Bid Opening, the Apparent Low Bidder will be notified so that they may submit the DBE Affirmation Form(s) online to ODOT. The Apparent Low Bidder is required to send the DBE Affirmation Form(s) within five (5) calendar days of the Bid Opening. This is to ensure that the DBE firms being used to meet the DBE goal of the contract have affirmed their participation per the DBE Utilization Plan. The Apparent Low Bidder shall submit a separate DBE Affirmation Form for each DBE being used. The DBE Affirmation Form(s) can be found at the following location:

https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources.

See the Special Provisions: ODOT's LPA Template – Required Contract Provisions, Provision No. 24 (Disadvantaged Business Enterprise (DBE) Utilization Plan and Good Faith Efforts) in the Specification Booklet portion of the Bid Package for additional details on the DBE Utilization Plan and the DBE Affirmation Form(s).

(d) Delivery of Proposals

The Proposal must contain the following documents:

1. Cuyahoga County Department of Public Works Construction Proposal Form;
2. Non-Collusion Affidavit;
3. Bid Guaranty (Bidder to provide);
4. Work Types Worksheet;
5. Drug-Free Safety Program (DFSP) Participation (see Special Provisions: ODOT's LPA Template-Required Contract Provisions, Provision No. 18);
6. Federally Required EEO Certification Form, select/circle the appropriate response (see Special Provisions: ODOT's LPA Template-Required Contract Provisions, Provision No. 6);
7. Certificate of Compliance with Affirmative Action Programs (see Special Provisions: ODOT's LPA Template – Required Contract Provisions, Provision No. 10).
8. **Evidence of Experience on Projects of Similar Complexity (see Section 2.02); and**
9. **Completed OPWC-EEO Requirements / Bid Conditions (see Special Provisions).**

Proposals containing the required documents must be submitted as follows:

To the Cuyahoga County Administrative Headquarters Department of Purchasing, 2079 East 9th Street, Second Floor, Room 2-200, Cleveland, Ohio 44115, no later than 2:00 PM (Local Time) on the Bid Due Date. The official closing time shall be determined by the wall clock located in the Cuyahoga County Department of Purchasing (same address). Late bids will be returned unopened. The outside of the sealed envelope must be clearly marked with the Bidder's name and address, the Project name, requisition number and the Bid Due Date, all as stated herein.

OR

In the Cuyahoga county Supplier Portal System, no later than 2:00 PM (Local Time) on the Bid Due Date. The official closing time shall be determined by the Supplier Portal clock. Late bids will not be opened.

Immediately following 2:00 PM on the Bid Due Date, the Proposals received will be publicly opened and read aloud at the Department of Purchasing in accordance with the "Legal Notice to Bidders" duly published. Proposals received after 2:00 PM local time on the Bid Due Date will be returned to the Bidder unopened.

2.12 Award and Execution of Contract

Bidders shall refer to Section 103 of the "General Provisions" in the Cuyahoga County Engineer Specification Booklet for all information concerning award and execution of the Contract. Bidders are hereby alerted that if the County determines that a Proposal is unbalanced, pursuant to Sections 102.06(B)(e), 102.08 and 102.14(M) of the General Provisions in the Cuyahoga County Engineer Specification Booklet, the County may thereafter consider the Proposal irregular and may reject it.

In addition to the above, the applicable elements / requirements of the "Bid Award Method" per Section 501.14 (Standards for Awarding Contracts) and Section 501.15 (Required Certifications by Contractors) of the Cuyahoga County Code will also be in effect during the Award process (see Section 2, Attachment A).

2.13 Miscellaneous

(a) Insurance

Prior to the execution of the Contract, the successful Bidder shall furnish to Cuyahoga County the proof of the mandatory insurance documents required by Section 107.12 of the General Provisions (and of any additional insurance coverage(s) required per the Section 200 Special Provisions) found in the Cuyahoga County Engineer Specification Booklet. Per Section 107.12 of the General Provisions, ensure that the Certificate of Liability Insurance names County of Cuyahoga, Ohio, and its employees as additional insureds with all rights to due notices as specified in Section 107.12 of the General Provisions.

(b) Workers' Compensation Certificate

Prior to the execution of the Contract, the successful Bidder shall furnish to Cuyahoga County the official certificate evidencing compliance with the Workers' Compensation laws of the State of Ohio and shall comply with the requirements of Section 107.12.A of the General Provisions found in the Cuyahoga County Engineer Specification Booklet.

(c) Wage Rates

The Contractor shall pay all laborers, workers, and mechanics according to the prevailing wage scale for the Cuyahoga County area, as set forth in Section 5 of the Proposal Package. The Contractor shall have sole responsibility for complying with all applicable provisions of ORC Section 4115. Should the prevailing wage rates be changed during the life of the Contract, the Contractor shall pay any such increases in the wage rates without obligation on the part of the County to pay for any increase in the Contract Price. The County hereby appoints **Anthony DiVencenzo** to serve as the Prevailing Wage Coordinator during the life of this Contract, per ORC Section 4115.

(d) LCPtracker

Throughout the course of the contract, the Prime Contractor and all subcontractors shall submit certified payroll reports documenting all construction worker hours performed on the project through the LCPtracker labor compliance monitoring system. LCPtracker is an online compliance system that allows contractors to submit certified payroll reports electronically. Contractors are responsible for ensuring that they and their subcontractors are trained in the use of LCPtracker and have the necessary capacity to enter payroll reports through LCPtracker. All certified payroll reports must be submitted through LCPtracker. No paper certified payroll reports will be accepted.

LCPtracker is an online labor compliance monitoring software suite that allows contractors and subcontractors to complete, certify and submit certified payroll reports to the County electronically. All payroll reports submitted to demonstrate compliance with O.R.C. 4115 must be submitted through LCPtracker.

Once a construction contract has been awarded, a username for LCPtracker will be created for the Contractor and any identified subcontractors. This username and password will allow contractors to access LCPtracker to enter payroll information, familiarize themselves with the system and receive training.

LCPtracker offers contractors online training multiple times per week and has video training available for contractor training anytime.

Contractors are responsible for ensuring that their internal staff, as well as their construction subcontractors, are familiar with the LCPtracker system and can enter payrolls through LCPtracker.

(e) Mechanic's Lien Law

All Contractors, Subcontractors, vendors, managers, materialmen, and laborers who have or will have a direct or indirect interest in the Contract are advised that after a contract has been awarded and executed, the administrator of the Contract will prepare the "Notices of Commencement" and submit same for filing with Cuyahoga County, per ORC 1311.252.

2.14 Pre-Bid Meeting

A pre-bid meeting will be held on **_____, 20__ at __:__ AM/PM** at the Cuyahoga County Administrative Headquarters, Department of Public Works, 2079 E. 9th Street, Room _____, Cleveland, Ohio, 44115. The purpose of this meeting is to provide prospective bidders, prime contractors and subcontractors open opportunity to interact and ask questions regarding the bidding procedure and contract documents for this project. Attendance at the pre-bid meeting is strongly recommended.

2.15 Electronic Signatures

By submitting a Proposal in the manner specified in Sections 2.11(b) and (c), the Contractor agrees on behalf of the submitting business entity, its officers, employees, Subcontractors, subgrantees, agents or assigns, that all contract documents requiring County signatures may be executed by electronic means, and that the electronic signatures affixed by the County to said documents shall have the same legal effect as if that signature was manually affixed to a paper version of the document. The Contractor also agrees on behalf of the aforementioned entity and persons, to be bound by the provisions of Chapters 304 and 1306 of the Ohio Revised Code as they pertain to electronic transactions, and to comply with the electronic signature policy of Cuyahoga County.

2.16 Compliance with Cuyahoga County Code

All County contracts are subject to the requirements of the Cuyahoga County Code, including, but not limited to, the County's Ethics policy and the County's Contracting and Purchasing Procedures policy. The Cuyahoga County Code is available at http://code.cuyahogacounty.us .

2.17 Indemnification

Contractor hereby indemnifies, defends and holds harmless the County and its respective officers, officials, directors, board members, employees, and agents, from and against all claims, damages, losses, liens, causes of action, suits, judgments and expenses (including attorney's fees and other costs of defense), of any nature, kind or description, that result from (a) the negligent acts or omissions of Contractor, including all of its officers, owners, principals, subcontractors, employees, and agents, or (b) breach or default by Contractor under any terms or provisions of this Contract.

Contractor acknowledges that, as a political subdivision of the State of Ohio, the County does not indemnify any person or entity. Contractor agrees that no provision of this Contract or any other contract or agreement between Contractor and the County may be interpreted to obligate the County to indemnify or defend Contractor or any other party.

2.18 Governing Law / Jurisdiction

This Contract shall be governed by, and shall be construed and enforced in accordance with, the laws of the State of Ohio. The parties agree that the state and federal courts sitting in Ohio will have exclusive jurisdiction over any claim arising out of this Contract, and each party consents to the exclusive jurisdiction of such courts. Contractor hereby agrees not to challenge this Governing Law and Jurisdiction provision, and further agrees not to attempt to remove any legal action outside of Cuyahoga County for any reason.

2.19 Annual Appropriations (for contracts in excess of $50,000)

All of the County's obligations under this Contract are contingent upon the County Council's appropriating the funds on an annual basis necessary for the continuation of this Contract in any contract year. In the event the funds necessary for the continuation of this Contract are not appropriated or approved, the County will notify the Contractor of such occurrence in writing. This Contract shall thereafter terminate and be rendered null and void on the last day of the last fiscal period for which appropriations were made. Such termination is made pursuant to and in accordance with the terms of this Contract and shall not be considered a breach or default on the part of the County and shall not result in the County having liability to the Contractor or any third party for any penalty, liability, or any other expense.

ATTACHMENT A

BID AWARD METHOD

PER SECTION 501.14 (STANDARDS FOR AWARDING CONTRACTS)
AND
SECTION 501.15 (REQUIRED CERTIFICATIONS BY CONTRACTORS)
OF THE CUYAHOGA COUNTY CODE

BID AWARD METHOD

(Per Section 501.14 of the Cuyahoga County Code)
Standards for Awarding Contracts

Contracts and purchases which require competitive bidding and are awarded in accordance with Chapter 501 of the County Code shall be awarded to the lowest and best bidder meeting the specifications that are most advantageous to Cuyahoga County. The County reserves the right to consider all elements entering into the question of determining the lowest and best bid, including the following:

a) whether the bidder has the appropriate experience, reputation, and workforce to perform the required work (requires approval from ODOT and FHWA prior to rejection of bids under these conditions);

b) N/A for federal aid projects;

c) N/A for federal aid projects;

d) whether the bidder has adhered to all conditions and requirements of the bid and specifications;

e) the quality of the product or service provided by the bidder on previous projects (requires approval from ODOT and FHWA prior to rejection of bids under these conditions);

f) with respect to a bidder whose bid is substantially below that of the next lowest bidder, supplemental details regarding the bid and/or historical information regarding performance and costs on similar contracts to demonstrate the bidder's ability to complete the contract at the price specified (requires approval from ODOT and FHWA prior to rejection of bids under these conditions);

g) whether the bidder can comply with the criteria outlined in Section 501.15 of the County Code;

h) N/A for federal aid projects;

i) maintenance costs and warranty provisions provided for in the bid;

j) the delivery or completion date provided for in the bid;

k) N/A for federal aid projects;

l) N/A for federal aid projects;

m) N/A for federal aid projects;

n) N/A for federal aid projects;

o) whether the bidder meets any other requirements determined by the County to be specifically relevant to the proposed contract (requires approval from ODOT and FHWA prior to rejection of bids under these conditions).

(Per Section 501.15 of the Cuyahoga County Code)
Required Certifications by Contractors

At the time of execution of the contract, the Contractor shall certify that it:

a) shall be in compliance with Ohio's Drug-Free Workplace requirements, including, but not limited to, maintaining a substance abuse policy that its personnel are subject to on the contract (the Contractor shall provide this policy upon request);

b) N/A for federal aid projects;

c) is in compliance and will remain in compliance with Federal and Ohio Equal Opportunity Employment Laws;

d) N/A for federal aid projects;

e) N/A for federal aid projects;

f) N/A for federal aid projects;

g) N/A for federal aid projects;

h) N/A for federal aid projects;

i) N/A for federal aid projects;

j) N/A for federal aid projects;

k) N/A for federal aid projects;

l) shall provide access as needed and allow the Agency of the Inspector General to perform the functions provided for in Section 501.21 of the County Code; and

m) shall require all its subcontractors, at the time of execution of a subcontract, to make all the certifications required in Section 501.15 except for Subsections **g and i**.

SECTION 3

REQUIRED BID DOCUMENTS

CHECKLIST FOR BIDDER'S USE:

The Proposal shall be submitted in a sealed envelope containing:

- ❑ Cuyahoga County Department of Public Works Construction Proposal Form (see Section 3, pg. 2 and 3)
- ❑ Non-Collusion Affidavit (see Section 3, pg. 5)
- ❑ Bid Guaranty (Bidder to provide per Section 2.06)
- ❑ Work Types Worksheet (see Section 3, pg. 6)
- ❑ Drug-Free Safety Program (DFSP) Participation (see Special Provisions: ODOT's LPA Template-Required Contract Provisions, Provision No. 19)
- ❑ Federally Required EEO Certification Form, select/circle the appropriate response (see Special Provisions: ODOT's LPA Template – Required Contract Provisions, Provision No. 6)
- ❑ Certificate of Compliance with Affirmative Action Programs (see Special Provisions: ODOT's LPA Template – Required Contract Provisions, Provision No. 11)
- ❑ "Buy America Certification" form, signature of certification (see Special Provisions: ODOT's LPA Template – Required Contract Provisions, Provision No. 2 and "Buy America Certification" form following after ODOT's LPA Template)
- ❑ **Evidence of Experience on Projects of Similar Complexity (see Section 2.02)**
- ❑ **Elect/Specify One of the Two "Bidder's Affirmative Action Requirements", Adopt the "Bidder's EEO Covenant" and Complete the "Bidder's Certification" of the State's EEO Requirements for OPWC-Assisted Construction Projects (see Special Provisions in Section 200 of the Cuyahoga County Engineer Specification Booklet)**

Cautionary Notes:

1. Sign the original Proposal in ink.
2. Be certain that the bid guaranty is for a specific sum in the amount as instructed herein.
3. If a bond is submitted as the bid guaranty be certain:
   a) The bond is properly executed and signed by both the Surety (Sureties) and the Bidder, with names of the parties signing the documents typed immediately below signature. Affix corporate seals.
   b) That the agent of the Surety has furnished credentials showing its power of attorney.
   c) A financial statement of the bonding company is provided.
   d) A "Certificate of Compliance" showing the legal right of the company to do business in the State of Ohio is provided.
4. Be certain the non-collusion affidavit is signed and notarized.
5. Per Section 2.12, Proposals found to be unbalanced may be rejected.

CUYAHOGA COUNTY DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION PROPOSAL FORM

PROJECT NAME: CUY-OLD ROCKSIDE ROAD REPLACEMENT OF EXISTING BRIDGE 00.42 OVER THE CUYAHOGA RIVER IN THE CITY OF INDEPENDENCE AND VILLAGE OF VALLEY VIEW, PID No. 91563, FAN E120(225)

REPORT NUMBER: 02-21 REQUISITION NUMBER: 7877

TOTAL ESTIMATED COST: $ 6,600,000.00

(No Award will be made for a "Grand Total Bid" greater than the "Total Estimated Cost", plus 10 percent of such estimated cost.)

BID DUE DATE: DATE

BIDDER NAME: _____

ADDRESS: _____

_____

_____

TELEPHONE: ( ) _____ FACSIMILE: ( ) _____

EMAIL: _____

To Cuyahoga County:

Having carefully examined this entire Bid Package, and all Addenda and Clarifications thereto, the signatory to this Proposal shall, if awarded this Contract, furnish all labor, materials, transportation and equipment necessary to complete all Work for the above-named Project, as required in the Bid Package, for the sum stated on the sheets that follow.

The Bidder further acknowledges that the County Department of Public Works' estimated quantities appearing on this proposal form are approximate only and are for the purpose of providing a uniform and accurate basis to compare bids for the awarding of the Contract. The Bidder further acknowledges that the use of the estimated quantities for the aforementioned purpose in no way binds the County to the use of said quantities, or any part thereof, in the execution of the Work. The Bidder also acknowledges that only those units *actually incorporated* in the Work will be paid for at the unit prices bid for the Work, and that the County Department of Public Works reserves the right to decrease or eliminate such items whenever deemed advisable in the progress of the Work.

SIGNATORY CONFIRMATION:

(I)/(We) shall accept as full compensation, for the aforesaid Work, a certain sum of money, which shall be determined by the work actually performed, and calculated upon the basis of completed units for each Contract Item and the unit price of each item, as set forth herein.

For the purpose of tabulating Bids, awarding the Contract, and certifying funds, this sum, which is the total amount of this bid proposal, shall be:

_____ Dollars

Bid total: $_____

(Enter above the "Grand Total Bid" from the "Itemized Unit Price Bid Sheets" found in this Proposal Form.)

On acceptance of this Proposal for said Work (I)/(We), do hereby bind (myself)/(ourselves) to enter into a written contract with Cuyahoga County within ten (10) days after the Award of the Contract, per ORC Section 153.54.

COMPANY NAME: _____

BUSINESS ADDRESS: _____

INCORPORATED UNDER THE LAWS OF THE STATE OF: _____

SIGNATURE:	_____	SIGNATURE:	_____
PRINTED NAME:	_____	PRINTED NAME:	_____
TITLE:	_____	TITLE:	_____
DATE:	_____	DATE:	_____
BUS. ADDRESS:	_____	BUS. ADDRESS:	_____
	_____		_____

SIGNATURE:	_____	SIGNATURE:	_____
PRINTED NAME:	_____	PRINTED NAME:	_____
TITLE:	_____	TITLE:	_____
DATE:	_____	DATE:	_____
BUS. ADDRESS:	_____	BUS. ADDRESS:	_____
	_____		_____

THE BIDDER HEREBY ACKNOWLEDGES RECEIPT OF THE FOLLOWING ADDENDA:

ADDENDUM NO. _____	DATED: _____	ADDENDUM NO. _____	DATED: _____
ADDENDUM NO. _____	DATED: _____	ADDENDUM NO. _____	DATED: _____
ADDENDUM NO. _____	DATED: _____	ADDENDUM NO. _____	DATED: _____

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
			ROADWAY					
1	201	11000	CLEARING AND GRUBBING	01	-	LS		
2	SPECIAL	20126450	STUMP REMOVED, 4"-12"	01	EACH	13		
3	201	26500	STUMP REMOVED, 18"	01	EACH	14		
4	201	26510	STUMP REMOVED, 30"	01	EACH	2		
5	201	26520	STUMP REMOVED, 48"	01	EACH	1		
6	202	23000	PAVEMENT REMOVED	16	SY	3,730		
7	202	30000	WALK REMOVED	NR	SF	56		
8	202	32000	CURB REMOVED	NR	FT	147		
9	202	32500	CURB AND GUTTER REMOVED	NR	FT	387		
10	202	35100	PIPE REMOVED, 24" AND UNDER	NR	FT	371		
11	202	38000	GUARDRAIL REMOVED	NR	FT	256		
12	202	58000	MANHOLE REMOVED	NR	EACH	1		
13	202	58100	CATCH BASIN REMOVED	NR	EACH	4		
14	202	75000	FENCE REMOVED	NR	FT	124		
15	202	75255	GATE REMOVED FOR REUSE, AS PER PLAN	37	EACH	1		
16	202	98100	REMOVAL MISC.: FLAG POLE REMOVED	NR	EACH	1		
17	202	98100	REMOVAL MISC.: LIGHT REMOVED	NR	EACH	1		
18	203	10000	EXCAVATION	04	CY	3,070		
19	203	20001	EMBANKMENT, AS PER PLAN	04	CY	316		
20	204	10000	SUBGRADE COMPACTION	04	SY	4,187		

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
21	204	30020	GRANULAR MATERIAL, TYPE C	07	CY	426		
22	204	51000	GEOGRID	07	SY	856		
23	SPECIAL	69012010	GEOTEXTILE FABRIC	07	SY	856		
24	209	60201	LINEAR GRADING, AS PER PLAN	04	SY	2,930		
25	606	15050	GUARDRAIL, TYPE MGS	36	FT	37.5		
26	606	26100	ANCHOR ASSEMBLY, TYPE E	36	EACH	1		
27	606	26500	ANCHOR ASSEMBLY, TYPE T	36	EACH	1		
28	606	35000	BRIDGE TERMINAL ASSEMBLY, TYPE 1	36	EACH	2		
29	608	10001	4" CONCRETE WALK, AS PER PLAN	38	SF	1,146		
30	608	52000	CURB RAMP	38	SF	210		
31	623	40501	REFERENCE MONUMENT, AS PER PLAN	NR	EACH	1		
32	623	40520	RIGHT-OF-WAY MONUMENT	NR	EACH	2		
SECTION TOTAL ROADWAY :								
			EROSION CONTROL					
33	659	00300	TOPSOIL	46	CY	300		
34	659	10001	SEEDING AND MULCHING, AS PER PLAN	46	SY	2,930		
35	659	14000	REPAIR SEEDING AND MULCHING	46	SY	130		
36	659	20000	COMMERCIAL FERTILIZER	46	TON	0.35		
37	659	31000	LIME	46	ACRE	0.06		
38	659	35000	WATER	46	MGAL	16		
39	670	00520	SLOPE EROSION PROTECTION MAT, TYPE B	35	SY	535		

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	I CTS	TOTAL AMOUNT BID DOLLARS	I CTS
40	832	15000	STORM WATER POLLUTION PREVENTION PLAN	08	-	LS				
41	832	15002	STORM WATER POLLUTION PREVENTION INSPECTIONS	08	-	LS				
42	832	15010	STORM WATER POLLUTION PREVENTION INSPECTION SOFTWARE	08	-	LS				
43	832	30000	EROSION CONTROL	08	EACH	60,000	$	1.00	$	60,000.00
SECTION TOTAL EROSION CONTROL :										
			DRAINAGE							
44	602	20000	CONCRETE MASONRY	35	CY	0.4				
45	605	14021	6" BASE PIPE UNDERDRAINS WITH GEOTEXTILE FABRIC, AS PER PLAN	35	FT	852				
46	611	97400	CONDUIT, MISC.: 6" CONDUIT, TYPE B, FOR DRAINAGE CONNECTION, AS PER PLAN	35	FT	50				
47	611	97400	CONDUIT, MISC.: 6" CONDUIT, TYPE C, FOR DRAINAGE CONNECTION, AS PER PLAN	35	FT	50				
48	611	01401	6" CONDUIT, TYPE E, AS PER PLAN	35	FT	70				
49	611	04401	12" CONDUIT, TYPE B, AS PER PLAN	35	FT	339				
50	611	05901	15" CONDUIT, TYPE B, AS PER PLAN	35	FT	36				
51	611	07401	18" CONDUIT, TYPE B, AS PER PLAN	35	FT	75				
52	611	08901	21" CONDUIT, TYPE B, AS PER PLAN	35	FT	180				
53	611	98181	CATCH BASIN, NO. 3A, AS PER PLAN (CUYAHOGA COUNTY NO. 3C)	35	EACH	3				
54	611	98391	CATCH BASIN, NO. 7, AS PER PLAN	35	EACH	1				
55	611	98471	CATCH BASIN, NO. 2-2B, AS PER PLAN	35	EACH	3				
56	611	98631	CATCH BASIN ADJUSTED TO GRADE, AS PER PLAN	35	EACH	3				
57	611	98631	CATCH BASIN ADJUSTED TO GRADE, AS PER PLAN A	35	EACH	1				
58	611	98631	CATCH BASIN ADJUSTED TO GRADE, AS PER PLAN B	35	EACH	1				

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
59	611	98635	CATCH BASIN RECONSTRUCTED TO GRADE, AS PER PLAN	35	EACH	1		
60	611	98690	CATCH BASIN, MISC.: TEMPORARY PLATE	35	EACH	1		
61	611	98701	INLET, SIDE DITCH, AS PER PLAN	35	EACH	1		
62	611	99575	MANHOLE, NO. 3, AS PER PLAN (WITH NO. 37 COVER)	35	EACH	2		
63	611	99575	MANHOLE, NO. 3, AS PER PLAN A	35	EACH	1		
64	611	99655	MANHOLE ADJUSTED TO GRADE, AS PER PLAN	35	EACH	1		
65	611	99661	MANHOLE RECONSTRUCTED TO GRADE, AS PER PLAN	35	EACH	1		
66	SPECIAL	61199820	MISCELLANEOUS METAL	35	LB	5,000		
						SECTION TOTAL DRAINAGE :		
			PAVEMENT					
67	254	01001	PAVEMENT PLANING, ASPHALT CONCRETE, AS PER PLAN, 1.25"	13	SY	184		
68	254	01001	PAVEMENT PLANING, ASPHALT CONCRETE, AS PER PLAN, 3"	13	SY	1,222		
69	302	46001	ASPHALT CONCRETE BASE, PG64-22, AS PER PLAN	10	CY	359		
70	304	20001	AGGREGATE BASE, AS PER PLAN	09	CY	682		
71	407	20000	NON-TRACKING TACK COAT	11	GAL	571		
72	441	50101	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (448), PG64-22, AS PER PLAN	10	CY	85		
73	441	50101	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (448), PG70-22M, AS PER PLAN	10	CY	97		
74	441	50301	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (448), PG64-22, AS PER PLAN	10	CY	245		
75	452	12010	8" NON-REINFORCED CONCRETE PAVEMENT, CLASS QC 1P	38	SY	32		
76	609	12001	COMBINATION CURB AND GUTTER, TYPE 2, AS PER PLAN A	38	FT	584		
77	609	12001	COMBINATION CURB AND GUTTER, TYPE 2, AS PER PLAN B	38	FT	118		

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	UNIT PRICE BID I CTS	TOTAL AMOUNT BID DOLLARS	TOTAL AMOUNT BID I CTS
78	609	18001	COMBINATION CURB AND GUTTER, TYPE 3, AS PER PLAN	38	FT	47				
79	609	24511	CURB, TYPE 4-C, AS PER PLAN	38	FT	29				
80	609	26001	CURB, TYPE 6, AS PER PLAN	38	FT	165				
81	875	10000	LONGITUDINAL JOINT ADHESIVE	10	LB	192				
SECTION TOTAL PAVEMENT :										
			WATER WORK							
82	202	75610	VALVE BOX REMOVED	35	EACH	1				
83	638	07500	12" GATE VALVE	35	EACH	1				
84	638	08620	12" INSERTING VALVE AND VALVE BOX	35	EACH	2				
85	638	10300	FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE	35	EACH	1				
86	638	10400	FIRE HYDRANT ADJUSTED TO GRADE	35	EACH	1				
87	638	10700	FIRE HYDRANT REMOVED AND DISPOSED OF	35	EACH	2				
88	638	10801	VALVE BOX ADJUSTED TO GRADE, AS PER PLAN	35	EACH	3				
89	SPECIAL	63820172	12" WATER MAIN DIP CLASS 52 BOLTLESS RESTRAINED JOINTS AND FITTINGS	35	FT	240				
90	SPECIAL	63820750	6" FIRE HYDRANT FURNISHING AND SETTING, COMPLETE	35	EACH	2				
91	SPECIAL	63820884	CUT AND PLUG EXISTING 12" WATER LINE	35	EACH	2				
SECTION TOTAL WATER WORK :										

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
			TRAFFIC CONTROL					
92	630	03100	GROUND MOUNTED SUPPORT, NO. 3 POST	42	FT	144.5		
93	630	80101	SIGN, FLAT SHEET, AS PER PLAN	42	SF	42.3		
94	630	84900	REMOVAL OF GROUND MOUNTED SIGN AND DISPOSAL	42	EACH	8		
95	630	85100	REMOVAL OF GROUND MOUNTED SIGN AND REERECTION	42	EACH	3		
96	630	85200	REMOVAL OF GROUND MOUNTED SIGN AND DELIVERY	42	EACH	6		
97	630	85201	REMOVAL OF GROUND MOUNTED SIGN AND DELIVERY, AS PER PLAN	42	EACH	1		
98	630	86002	REMOVAL OF GROUND MOUNTED POST SUPPORT AND DISPOSAL	42	EACH	18		
99	630	89816	REMOVAL OF WOOD POLE AND REERECTION	42	EACH	1		
100	630	97700	SIGNING, MISC.: SIGN ADJUSTED	42	EACH	1		
101	646	10000	EDGE LINE, 4"	45	MILE	0.25		
102	646	10200	CENTER LINE	45	MILE	0.22		
103	646	10400	STOP LINE	45	FT	65		
104	646	10500	CROSSWALK LINE	45	FT	90		
105	646	20000	RAILROAD SYMBOL MARKING	45	EACH	1		
106	646	20200	PARKING LOT STALL MARKING	45	FT	1,242		
SECTION TOTAL TRAFFIC CONTROL :								

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	I CTS	TOTAL AMOUNT BID DOLLARS	I CTS
			RETAINING WALLS							
107	503	11100	COFFERDAMS AND EXCAVATION BRACING	53	-	LS				
108	503	21301	UNCLASSIFIED EXCAVATION, AS PER PLAN	38	-	LS				
109	504	11100	STEEL SHEET PILING LEFT IN PLACE (MINIMUM SECTION MODULUS OF 30 CUBIC INCHES PER FOOT OF WALL)	53	SF	125				
110	509	10001	EPOXY COATED REINFORCING STEEL, AS PER PLAN	23	LB	10,644				
111	511	46213	CLASS QC1 CONCRETE WITH QC/QA, RETAINING/WINGWALL INCLUDING FOOTING, AS PER PLAN	38	CY	68				
112	511	53012	CLASS QC2 CONCRETE, MISC.: MOMENT SLAB WITH QC/QA, AS PER PLAN	38	CY	21				
113	511	71200	CONCRETE, MISC.: ARCHITECTURAL TREATMENT	38	SF	543				
114	512	10050	SEALING OF CONCRETE SURFACES (NON-EPOXY)	57	SY	50				
115	512	33000	TYPE 2 WATERPROOFING	40	SY	2				
116	512	33300	TYPE A WATERPROOFING	40	SY	35				
117	512	44400	TYPE B WATERPROOFING	40	SY	2				
118	SPECIAL	51275500	SEALING: ELASTOMERIC PROTECTIVE AND DECORATIVE CONCRETE COATING	57	SY	22				
119	516	13200	1/2" PREFORMED EXPANSION JOINT FILLER	27	SF	71				
120	516	13601	1" PREFORMED EXPANSION JOINT FILLER, AS PER PLAN	27	SF	6				
121	517	75121	RAILING (CONCRETE PARAPET WITH TWIN STEEL TUBE RAILING), AS PER PLAN	38	FT	69				
122	518	21201	POROUS BACKFILL WITH GEOTEXTILE FABRIC, AS PER PLAN	35	CY	25				
123	518	40000	6" PERFORATED CORRUGATED PLASTIC PIPE	35	FT	92				
124	SPECIAL	53000200	STRUCTURES: PROTECTION OF FACILITIES	38	-	LS				
						SECTION TOTAL RETAINING WALLS :				
			STRUCTURE OVER 20 FOOT SPAN (OLD ROCKSIDE 00.42 SFN 1876083)							

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	I CTS	TOTAL AMOUNT BID DOLLARS	I CTS
125	202	11003	STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN	19	-	LS				
126	202	23500	WEARING COURSE REMOVED	19	SY	348				
127	208	14001	VIBRATION CONTROL AND MONITORING, AS PER PLAN	53	-	LS				
128	503	11100	COFFERDAMS AND EXCAVATION BRACING	53	-	LS				
129	503	21301	UNCLASSIFIED EXCAVATION, AS PER PLAN	21	-	LS				
130	505	11100	PILE DRIVING EQUIPMENT MOBILIZATION	53	-	LS				
131	507	501	12" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN, AS PER PLAN	53	FT	2,230				
132	507	551	12" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED, AS PER PLAN	53	FT	2,370				
133	507	601	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, DRIVEN, AS PER PLAN	53	FT	2,790				
134	507	651	14" CAST-IN-PLACE REINFORCED CONCRETE PILES, FURNISHED, AS PER PLAN	53	FT	2,950				
135	507	92201	PREBORED HOLES, AS PER PLAN	53	FT	300				
136	509	10001	EPOXY COATED REINFORCING STEEL, AS PER PLAN	23	LB	132,862				
137	511	33500	SEMI-INTEGRAL DIAPHRAGM GUIDE	21	EACH	2				
138	511	34447	CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK, AS PER PLAN	21	CY	351				
139	511	40513	CLASS QC1 CONCRETE WITH QC/QA, PIER ABOVE FOOTINGS, AS PER PLAN	21	CY	276				
140	511	43513	CLASS QC1 CONCRETE WITH QC/QA, ABUTMENT INCLUDING FOOTING, AS PER PLAN	21	CY	132				
141	511	46513	CLASS QC1 CONCRETE WITH QC/QA, FOOTING, AS PER PLAN	21	CY	104				
142	511	51513	CLASS QC2 CONCRETE WITH QC/QA, SIDEWALK, AS PER PLAN	21	CY	69				
143	511	71200	CONCRETE, MISC.: ARCHITECTURAL TREATMENT	38	SF	6,785				
144	512	10050	SEALING OF CONCRETE SURFACES (NON-EPOXY)	57	SY	233				

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	I CTS	TOTAL AMOUNT BID DOLLARS	I CTS
145	512	33300	TYPE A WATERPROOFING	40	SY	102				
146	512	44400	TYPE B WATERPROOFING	40	SY	15				
147	SPECIAL	51275500	SEALING: ELASTOMERIC PROTECTIVE AND DECORATIVE CONCRETE COATING	57	SY	391				
148	513	10000	STRUCTURAL STEEL MEMBERS, LEVEL UF	24	-	LS				
149	513	10260	STRUCTURAL STEEL MEMBERS, LEVEL 3	21	LB	418,100				
150	513	20000	WELDED STUD SHEAR CONNECTORS	25	EACH	4,230				
151	514	00800	FIELD PAINTING STRUCTURAL STEEL, INTERMEDIATE COAT	26	LB	418,100				
152	514	00850	FIELD PAINTING STRUCTURAL STEEL, FINISH COAT	26	LB	418,100				
153	516	10010	ARMORLESS PREFORMED JOINT SEAL	27	FT	78				
154	516	13600	1" PREFORMED EXPANSION JOINT FILLER	27	SF	14				
155	516	13900	2" PREFORMED EXPANSION JOINT FILLER	27	SF	156				
156	516	14020	SEMI-INTEGRAL ABUTMENT EXPANSION JOINT SEAL	27	FT	81				
157	516	44101	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) (BEARING - 1'-10" X 1'-6 1/2" X 2 13/16", LOAD PLATE - 1'-7 1/2" X 1'-11" X 1 13/16"), AS PER PLAN	27	EACH	12				
158	516	44201	ELASTOMERIC BEARING WITH INTERNAL LAMINATES AND LOAD PLATE (NEOPRENE) (BEARING - 1'-2" X 1'-0" X 3 1/8", LOAD PLATE - 1'-3" X 1'-1" X 1 1/2"), AS PER PLAN	27	EACH	12				
159	517	75121	RAILING (CONCRETE PARAPET WITH TWIN STEEL TUBE RAILING), AS PER PLAN	21	FT	582				
160	518	21201	POROUS BACKFILL WITH GEOTEXTILE FABRIC, AS PER PLAN	35	CY	51				
161	518	40000	6" PERFORATED CORRUGATED PLASTIC PIPE	35	FT	104				
162	518	40010	6" NON-PERFORATED CORRUGATED PLASTIC PIPE, INCLUDING SPECIALS	35	FT	60				
163	523	20001	DYNAMIC LOAD TESTING, AS PER PLAN	53	EACH	4				
164	523	20501	RESTRIKE, AS PER PLAN	53	EACH	4				

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	UNIT PRICE BID I CTS	TOTAL AMOUNT BID DOLLARS	TOTAL AMOUNT BID I CTS
165	526	25001	REINFORCED CONCRETE APPROACH SLABS (T=15"), AS PER PLAN	38	SY	223				
166	526	90030	TYPE C INSTALLATION	38	FT	78				
167	SPECIAL	53000200	STRUCTURES: PROTECTION OF FACILITIES	NR	-	LS				
168	SPECIAL	53000200	STRUCTURES: PRECONSTRUCTION CONDITION SURVEY	NR	-	LS				
169	SPECIAL	53000200	STRUCTURES: PROPOSED GAS LINE PIPE SLEEVES	NR	-	LS				
170	601	20000	CRUSHED AGGREGATE SLOPE PROTECTION	35	SY	3				
171	601	23021	ARTICULATING CONCRETE BLOCK REVETMENT SYSTEM, TYPE 3, AS PER PLAN	35	SY	940				
172	601	34001	ROCK CHANNEL PROTECTION, TYPE A WITHOUT FILTER, AS PER PLAN	35	CY	305				
173	625	33000	STRUCTURE GROUNDING SYSTEM	21	EACH	1				
174	SPECIAL	69098400	CONTRACTOR ACCESS	NR	-	LS				
175	SPECIAL	69098400	WORK INVOLVING ASBESTOS CONTAINING MATERIALS	NR	-	LS				
SECTION TOTAL STRUCTURE OVER 20 FOOT SPAN (OLD ROCKSIDE 00.42 SFN 1876083) :										

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
			MAINTENANCE OF TRAFFIC					
176	202	23000	PAVEMENT REMOVED	16	SY	2,231		
177	202	35100	PIPE REMOVED, 24" AND UNDER	NR	FT	95		
178	202	42040	ANCHOR ASSEMBLY REMOVED, TYPE T	NR	EACH	1		
179	202	47000	BRIDGE TERMINAL ASSEMBLY REMOVED	NR	EACH	1		
180	202	38000	GUARDRAIL REMOVED	NR	FT	75		
181	202	58100	CATCH BASIN REMOVED	NR	EACH	2		
182	203	10000	EXCAVATION	04	CY	459		
183	203	20001	EMBANKMENT, AS PER PLAN	04	CY	3,151		
184	204	30020	GRANULAR MATERIAL, TYPE C	04	CY	288		
185	204	51000	GEOGRID	07	SY	362		
186	204	10000	SUBGRADE COMPACTION	04	SY	2,681		
187	302	46001	ASPHALT CONCRETE BASE, PG64-22, AS PER PLAN	10	CY	251		
188	304	20001	AGGREGATE BASE, AS PER PLAN	09	CY	487		
189	407	20000	NON-TRACKING TACK COAT	11	GAL	226		
190	410	12000	TRAFFIC COMPACTED SURFACE, TYPE A OR B	04	CY	15		
191	441	50101	ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (448), PG70-22M, AS PER PLAN	10	CY	78		
192	441	50301	ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (448), AS PER PLAN, PG64-22	10	CY	109		
193	502	11101	STRUCTURE FOR MAINTAINING TRAFFIC, AS PER PLAN	NR	-	LS		
194	606	15050	GUARDRAIL, TYPE MGS	36	FT	75		
195	606	26500	ANCHOR ASSEMBLY, TYPE T	36	EACH	1		

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS	I CTS	TOTAL AMOUNT BID DOLLARS	I CTS
196	606	35000	BRIDGE TERMINAL ASSEMBLY, TYPE 1	36	EACH	1				
197	611	04401	12" CONDUIT, TYPE B, AS PER PLAN	35	FT	95				
198	611	98471	CATCH BASIN, NO. 2-2B, AS PER PLAN	35	EACH	2				
199	614	11110	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE	NR	HOUR	40				
200	614	12380	WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL)	39	EACH	7				
201	614	13000	ASPHALT CONCRETE FOR MAINTAINING TRAFFIC	39	CY	20				
202	614	13310	BARRIER REFLECTOR, TYPE 1, BIDIRECTIONAL	39	EACH	30				
203	614	13314	BARRIER REFLECTOR, TYPE 3, BIDIRECTIONAL	39	EACH	6				
204	614	13360	OBJECT MARKER, TWO WAY	39	EACH	30				
205	614	21100	WORK ZONE CENTER LINE, CLASS I, 642 PAINT	39	MILE	0.60				
206	614	21550	WORK ZONE CENTER LINE, CLASS III, 642 PAINT	39	MILE	0.22				
207	614	22100	WORK ZONE EDGE LINE, CLASS I, 4", 642 PAINT	39	MILE	0.40				
208	614	22350	WORK ZONE EDGE LINE, CLASS III, 4", 642 PAINT	39	MILE	0.24				
209	614	24200	WORK ZONE DOTTED LINE, CLASS I, 4", 642 PAINT	39	FT	80				
210	614	26200	WORK ZONE STOP LINE, CLASS I, 642 PAINT	39	FT	100				
211	614	26610	WORK ZONE STOP LINE, CLASS III, 642 PAINT	39	FT	65				
212	614	32200	WORK ZONE RAILROAD SYMBOL MARKING, CLASS I, 642 PAINT	39	EACH	1				
213	616	10000	WATER	NR	MGAL	12				
214	616	20000	CALCIUM CHLORIDE	NR	TON	1.20				
215	622	41100	PORTABLE BARRIER, UNANCHORED	39	FT	561				
216	659	10001	SEEDING AND MULCHING, AS PER PLAN	08	SY	1,638				

REF NO.	ITEM NUMBER	ITEM EXTENSION	ITEM DESCRIPTION	WORK TYPE	UNIT	ESTIMATED QUANTITY	UNIT PRICE BID DOLLARS I CTS	TOTAL AMOUNT BID DOLLARS I CTS
217	659	14000	REPAIR SEEDING AND MULCHING	08	SY	90		
218	659	35000	WATER	08	MGAL	11		
219	659	40000	MOWING	08	MSF	15.5		
220	670	00520	SLOPE EROSION PROTECTION MAT, TYPE B	35	SY	1,595		
SECTION TOTAL MAINTENANCE OF TRAFFIC :								
			INCIDENTALS					
221	614	11001	MAINTAINING TRAFFIC, AS PER PLAN	39	-	LS		
222	619	16021	FIELD OFFICE, TYPE C, AS PER PLAN	NR	MNTH	20		
223	623	10001	CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN	NR	-	LS		
224	624	10000	MOBILIZATION	NR	-	LS		
225	SPECIAL	69098400	PROJECT DVD RECORDING (SEE PROPOSAL NOTE)	NR	-	LS		
226	SPECIAL	10810000	CPM PROGRESS SCHEDULE (SEE PROPOSAL NOTE)	NR	-	LS		
SECTION TOTAL INCIDENTALS :								
GENERAL CONTINGENCY FOR UNFORESEEN CONDITIONS (100% LOCAL):								**$ 400,000.00**
GRAND TOTAL BID :								

NON-COLLUSION AFFIDAVIT

REQUISITION NUMBER: 7877

STATE OF OHIO)
) SS.
COUNTY OF CUYAHOGA)

_____ being first duly
(officer of firm, company, corporation, etc.)

sworn, deposes and says that he/she is the _____ of
(sole owner, partner, president, etc.)

_____ making the
(firm, company, corporation, etc.)

foregoing Proposal and Bid: that such Bid is genuine and not collusive or a sham: that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any other bidder or person to put in a sham Bid, or that such other person shall refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against the County or any persons interested in the proposed contract; and that all statements contained in said Proposal and Bid are true; and further that such bidder has not, directly or indirectly submitted this Bid, or contents thereof, or divulged information relative thereto to any association or to any member or agent thereof.

_____
(AFFIANT)

Sworn to and subscribed before me on this date: _____

_____
(NOTARY PUBLIC)

My commission expires:

(SEAL)

WORK TYPES WORKSHEET

PROJECT NAME: CUY-OLD ROCKSIDE ROAD REPLACEMENT OF EXISTING BRIDGE 00.42 OVER THE CUYAHOGA RIVER IN THE CITY OF INDEPENDENCE AND VILLAGE OF VALLEY VIEW, PID No. 91563, FAN E120(225)

REQUISITION NUMBER: 7877

BIDDER NAME: _____

WORK TYPE	ASSOCIATED REFERENCE NUMBERS	TOTAL BID AMOUNT FOR WORK TYPE

ATTACH ADDITIONAL SHEETS AS NEEDED

WORK TYPE TOTAL DOLLAR AMOUNT: _____

TOTAL AMOUNT BID: _____

The Work Type Total Dollar Amount must be equal to or greater than 50% of the Total Amount Bid or the bid shall be rejected.

Instructions: On the "Itemized Unit Price Bid Sheets" each line item is assigned a reference number and a required ODOT work type, or it is stated that no work type is required (NR). The Bidder shall complete this worksheet by entering each ODOT work type he/she is qualified to perform, including work type NR, followed by all the reference numbers associated with each individual ODOT work type. The "Total Bid Amount" for each ODOT work type shall then be entered. The "Work Type Total Dollar Amount" shall then be determined and entered on this worksheet.

SECTION 4

SAMPLE CONTRACT FORMS

THESE SAMPLE CONTRACT FORMS ARE NOT TO BE COMPLETED BY THE BIDDER BUT WILL BE COMPLETED AFTER THE CONTRACT IS AWARDED

CUYAHOGA COUNTY FORM OF AGREEMENT

PERFORMANCE AND PAYMENT BOND (ORC 153.57)

CONSTRUCTION CONTRACT EXEMPTION CERTIFICATE

CUYAHOGA COUNTY FORM OF AGREEMENT

UNIT PRICE CONTRACT

THIS CONTRACT, made and entered into this _____ day of _____, 20_____, by and between the County of Cuyahoga, Ohio (the "County"), and **_____, a Contractor** with principal offices located at _____(the "Provider").

WITNESSETH: That for and in consideration of payments hereinafter mentioned, to be made by the County, the Provider agrees to furnish all materials, appliances, tools, and labor, and perform all the work required for:

Project Description:

Cuyahoga County, Ohio, according to the plans and specifications and estimates and to the satisfaction and acceptance of the County.

The Provider further covenants and agrees that the following papers shall be bound with or accompany and be an essential part of this Contract: Notices to bidders and proposals upon which this Contract was awarded; Plans and special specifications for the improvement contemplated by this Contract; The construction and material specifications together with the general clauses and covenants of the County in effect at the time this contract is entered into; Provider's Performance Bond and this Agreement.

It is expressly stipulated and agreed that the Provider hereby covenants and agrees that he has full knowledge of the site, plans, specifications, and conditions relative to the performance of the work contemplated by this contract and made an essential part thereof, and that the affixing of his/her signature hereto shall constitute complete acceptance of and compliance with aforesaid plans, specifications, and conditions.

In consideration of these promises, the County agrees to pay to the Provider a certain sum of money, which shall be determined by the work actually performed by the Provider, calculated upon the basis of completed units for each item of the contract ("Contract Item"), and the unit price of each Contract Item, as set forth in the proposal attached hereto and made a part hereof (the "Proposal"). This aforesaid sum, for the purposes of agreement and appropriation, and until actually calculated as aforementioned upon completion of the work, shall be understood to be:

Estimated Cost of Construction

_____ Dollars **($_____)**

By entering into this Contract I agree on behalf of the contracting business entity, its officers, employees, subcontractors, subgrantees, agents or assigns, to conduct this transaction by electronic means by agreeing that all documents requiring County signatures may be executed by electronic means, and that the electronic signatures affixed by the County to said documents shall have the same legal effect as if that signature was manually affixed to a paper version of the document. I also agree on behalf of the aforementioned entities and persons, to be bound by the provisions of Chapters 304 and 1306 of the Ohio Revised Code as they pertain to electronic transactions, and to comply with the electronic signature policy of Cuyahoga County.

IN WITNESS WHEREOF, the County and the Provider, through their duly authorized representatives, have hereunto subscribed and affixed their respective signatures.

IF AN INDIVIDUAL, DOING BUSINESS UNDER A FIRM NAME, SO STATE, GIVING BOTH NAMES.

IF A PARTNERSHIP, SO STATE, GIVING NAMES AND POST OFFICE ADDRESSES OF ALL PARTNERS ON LINES OPPOSITE.

IF A CORPORATION, GIVE FULL CORPORATION NAME AND STATE UNDER THE LAWS OF WHAT STATE YOU ARE INCORPORATED; OFFICER MUST INCLUDE SIGNATURE, TITLE, AND FURNISH A COPY, CURRENTLY DATED AND CERTIFIED BY THE SECRETARY OF THE CORPORATION OF A RESOLUTION BY THE BOARD OF DIRECTORS AUTHORIZING THE PARTICULAR OFFICER TO SIGN THE CONTRACT ON BEHALF OF THE COMPANY AND FURTHER CERTIFY THAT THE RESOLUTION IS IN FULL FORCE AND EFFECT.

COUNTY OF CUYAHOGA, OHIO

By: _____

Armond Budish, County Executive

FIRM: _____

SIGNATURE: _____

PRINTED NAME: _____

TITLE: _____

BOND OF PROVIDER

(PERFORMANCE and PAYMENT)

STATE OF OHIO – FOR THE USE OF CUYAHOGA COUNTY – SECTION 153.57 O.R.C.

KNOW ALL MEN BY THESE PRESENTS:

(1) That we as principal _____

_____(the "Principal")

(2) and we, as sureties _____

_____(the "Surety" or "Sureties")

are held and firmly bound unto the State of Ohio for the use of Cuyahoga County, Ohio in the penal sum of _____

_____

_____ ($_____) Dollars, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, That

Whereas, the Principal has heretofore filed with the County Executive of Cuyahoga County, Ohio, a written proposal for:

_____

in _____ Cuyahoga County (the "Proposal").

Whereas, said County Executive has accepted the Proposal, and has awarded to the Principal the contract for the construction and completion of the aforesaid work (the "Contract")

Now, if the Principal faithfully complies with and performs all of the terms, covenants and conditions of the Contract according to the tenor thereof, and within the time prescribed and in accordance with the plans, specifications, and estimates furnished therefore, to which reference is here made, the same being a part hereof, and as if fully incorporated herein; AND indemnifies the County against any damage that may result, by reason of any failure to perform said contract, or negligence of the providers in making said improvement or doing said work; AND pays all lawful claims of subcontractors, material men, and laborers for labor performed and materials furnished in carrying forward, performing or completing the Contract, the Principal and the Surety/Sureties shall be, for the benefit of any material man or laborer having a just claim, as well as for the obligee herein, shall be released from this obligation and this obligation shall be void. Otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any or all claims hereunder shall in no event exceed the penal amount of this obligation, as herein stated.

The Surety/Sureties hereby stipulate(s) and agree(s) that any failure to complete work at the time named in the Contract, or extensions of time for completion, or modifications, omissions, or additions in or to the terms of said contract, or in or to the plans, specifications and estimates, shall not in any way effect the obligations of the Surety/Sureties on their bond.

Signed this _____ day of _____, 20___

PROVIDER: _____

SIGNATURE: _____

PRINTED NAME: _____

TITLE: _____

BOND NO.: _____

PRINCIPAL: _____

Witnesses:

_____ _____

Ohio | Department of Taxation
tax.ohio.gov

STEC CC
Rev. 11/14

Sales and Use Tax
Construction Contract Exemption Certificate

Identification of Contract:

Contractee's (owner's) name: County of Cuyahoga, Ohio

Exact location of job/project: Old Rockside Road Sta. 26+00 to Sta. 38+00 in the City of Independence and Village of Valley View, Ohio

Name of job/project as it appears on contract documentation: CUY-Old Rockside Road Replacement of Existing Bridge 00.42 Over the Cuyahoga River in the City of Independence and Village of Valley View, PID No. 91563, FAN E120(225)

The undersigned hereby certifies that the tangible personal property purchased under this exemption certificate was purchased for incorporation into:

☐	A building used exclusively for charitable purposes by a nonprofit organization operated exclusively for charitable purposes as defined in Ohio Revised Code (R.C.) section 5739.02(B)(12);	☐	Real property that is owned, or will be accepted for ownership at the time of completion, by the United States government, its agencies, the state of Ohio or an Ohio political subdivision;
☑	Real property under a construction contract with the United States government, its agencies, the state of Ohio or an Ohio political subdivision;	☐	A computer data center entitled to exemption under R.C. 122.175;
☐	A horticulture structure or livestock structure for a person engaged in the business of horticulture or producing livestock;	☐	A building under a construction contract with an organization exempt from taxation under section 501(c)(3) of the Internal Revenue Code of 1986 when the building is to be used exclusively for the organization's exempt purposes;
☐	A house of public worship or religious education;		
☐	The original construction of a sports facility under R.C. section 307.696;	☐	A hospital facility entitled to exemption under R.C. section 140.08;
☐	Real property outside this state if such materials and services, when sold to a construction contractor in the state in which the real property is located for incorporation into real property in that state, would be exempt from a tax on sales levied by that state;	☐	Building and construction materials and services sold for incorporation into real property comprising a convention center that qualifies for property tax exemption under R.C. 5709.084 (until one calendar year after the construction is completed).

The original of this certificate must be signed by the owner/contractee and/or government official and must be retained by the prime contractor. Copies must be maintained by the owner/contractee and all subcontractors. When copies are issued to suppliers when purchasing materials, each copy must be signed by the contractor or subcontractor making the purchase.

Prime Contractor
Name _____
Signed by _____
Title _____
Street address _____
City, state, ZIP code _____
Date _____

Owner/Contractee
Name _____
Signed by _____
Title _____
Street address _____
City, state, ZIP code _____
Date _____

Subcontractor
Name _____
Signed by _____
Title _____
Street address _____
City, state, ZIP code _____
Date _____

Political Subdivision
Name County of Cuyahoga, Ohio
Signed by _____
Title Armond Budish, County Executive
Street address 2079 East Ninth Street
City, state, ZIP code Cleveland, Ohio 44115
Date _____

SECTION 5

WAGE DETERMINATION SCHEDULE

WAGE RATES
CUYAHOGA COUNTY
STATE OF OHIO

The Cuyahoga County prevailing wage rate scale shall be paid by the Contractor to all laborers and workers involved in the performance of the work, in accordance with the schedule of wages determined by the United States Department of Labor, Highway Construction Projects for Cuyahoga County, Ohio. Sample wage determination schedules can be found at the following website:

https://beta.SAM.gov

The Contractor shall comply with all of the provisions of Ohio Revised Code Section 4115-04, including but not limited to the payment of the prevailing rate of wages as altered or changed by collective bargaining agreements, or understanding, successor to the referenced schedule of wages. Should said wage rates be changed during the life of the Contract, the Contractor shall pay any increases in the wage rates without obligation on the part of the County for any increase in the contract price.

CUYAHOGA COUNTY ENGINEER

SPECIFICATION BOOKLET

HIGHWAY CONSTRUCTION

CUY-OLD ROCKSIDE ROAD
REPLACEMENT OF EXISTING BRIDGE 00.42
OVER THE CUYAHOGA RIVER
IN THE CITY OF INDEPENDENCE AND VILLAGE OF VALLEY VIEW
PID No. 91563
FAN E120(225)

CONTENTS:

SECTION

100	GENERAL PROVISIONS
200	SPECIAL PROVISIONS
300	SUPPLEMENTAL SPECIFICATIONS
400	PROPOSAL NOTES

SECTION 100

CUYAHOGA COUNTY ENGINEER

2019 GENERAL PROVISIONS

(Revised June 2021)

(Replaces Section 100 of the 2019 ODOT Construction and Material Specifications)

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101 DEFINITIONS AND TERMS

101.01 General.

These *General Provisions* and ODOT's *Construction and Material Specifications* are written to the Bidder before award of the Contract and to the Contractor after award of the Contract. The sentences that direct the Contractor to perform Work are typically written as commands. For example, a requirement to provide cold-weather protection would be expressed as, "Provide cold-weather protection for concrete," rather than "The Contractor shall provide cold-weather protection for concrete." In the imperative mood, the subject "the Bidder" or "the Contractor" is understood.

All requirements to be performed by others have been written in the active voice. Sentences written in the active voice identify the party responsible for performing the action. For example, "The Engineer will determine the density of the compacted material." Certain requirements of the Contractor may also be written in the active voice, rather than the active voice and imperative mood, if the sentence includes requirements for others in addition to the Contractor. For example, "After the Contractor provides initial written notice, the Engineer will revise the Contract as specified in 104.02."

Sentences that define terms, describe a product or desired result, or describe a condition that may exist are written in indicative mood. These types of sentences use verbs requiring no action. For example, "The characteristics of the soils actually encountered in the subgrade may affect the quality of the cement and depth of treatment necessary."

101.02 Abbreviations.

The following abbreviations, when used in the Contract Documents, represent the full text shown.

AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt Cement (pavement), Alternating Current (traffic)
ACBFS	Air Cooled Blast Furnace Slag (aggregate)
ACI	American Concrete Institute
ACIA	Asynchronous Communications Interface Adapter (traffic controller)
ADT	Average Daily Traffic
ADTT	Average Daily Truck Traffic
AIC	Amps Interrupting Capacity
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMRL	AASHTO Material Reference Library
ANFO	Ammonium Nitrate Fuel Oil
ANSI	American National Standards Institute
AOS	Apparent Opening Size (fabric)
AREA	American Railway Engineering Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWG	American Wire Gauge
AWPA	American Wood Protection Association
AWS	American Welding Society
AWWA	American Water Works Association
BBR	Bending Beam Rheometer (asphalt test)
BMP	Best Management Practice (erosion)
BOF	Basic Oxygen Furnace (aggregate)
BSG	Bulk Specific Gravity
BTEX	Benzene, toluene, ethyl benzene, and xylene (a soil test)
BUSTR	Bureau of Underground Storage Tank Regulations (Division of Fire Marshal)

CMS	Construction and Material Specifications of the Ohio Department of Transportation
CAPWAP	Case Pile Wave Analysis Program
CBAE	Cut Back Asphalt Emulsion
CCRL	Cement and Concrete Reference Laboratory
CCS	Crushed Carbonate Stone
CECI	Contactors Erosion Control Inspector
CFR	Code of Federal Regulations
CIE	Commission Internationale d'Eclairage (illumination)
CPESC	Certified Professional in Erosion and Sediment Control
CRS	Cationic Rapid Set (asphalt emulsion)
CRSI	Concrete Reinforcing Steel Institute
CSS	Cationic Slow Set (asphalt emulsion)
CVN	Charpy V-notch (steel test)
CWT	Hundred Weight (100 lbs.)
DC	Direct Current
DCA	District Construction Administrator
DCE	District Construction Engineer
DDD	District Deputy Director
DET	District Engineer of Tests
DGE	District Geotechnical Engineer
DLS	Data Logging System (traffic markings)
DNR	Department of Natural Resources
DRC	Dry Rodded Condition (asphalt test)
DSR	Dynamic Shear Rheometer (asphalt test)
DZA	Deficient Zone Average (concrete test)
EAF	Electric Arc Furnace
EDA	Earth Disturbing Activity
EEI	Edison Electric Institute
EIA	Electronic Industries Alliance
EPA	Environmental Protection Agency
EQS	Exceptional Quality Solids (compost)
FAA	Fine Aggregate Angularity (asphalt aggregate)
FCM	Fracture Critical Member (steel test)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration, Department of Transportation
FRP	Fiber Reinforced Polymer
FSS	Federal Specifications and Standards, General Services Administration
GGBFS	Ground Granulated Blast Furnace Slag
GS	Granulated Slag
HDPE	High Density Polyethylene
HMWM	High Molecular Weight Methacrylate
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
IPS	International Pipe Standard
ISSA	International Slurry Seal Association
ITE	Institute of Transportation Engineers
IZEU	Inorganic Zinc Epoxy Urethane
JMF	Job Mix Formula
LED	Light Emitting Diode
LWT	Loaded Wheel Test (asphalt test)
MBF	Thousand Board Feet (wood)
MC	Medium Cure (asphalt emulsion)
MCB	Microchannel Bus (traffic controller)

MMK	Blaw-Knox Materials Management Kit
MOV	Metal Oxide Varistor (traffic controller)
MPI	Magnetic Particle Inspection (steel test)
MSG	Maximum Specific Gravity (asphalt)
MTD	Maximum Theoretical Density (asphalt)
NACE	National Association of Corrosion Engineers
NCHRP	National Cooperative Highway Research Program
NEMA	National Electrical Manufacturers Association
NHI	National Highway Institute
NIST	National Institute of Standards and Technology
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OAC	Ohio Administrative Code
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OH	Open Hearth (aggregate)
OHWM	Ordinary High Water Mark
OMM	Office of Materials Management (the Central Office Laboratory)
OMUTCD	Ohio Manual of Uniform Traffic Control Devices
ORC	Ohio Revised Code
ORDC	Ohio Rail Development Commission
OSHA	Occupational Safety and Health Administration
OTE	Office of Traffic Engineering
OWPCA	Ohio Water Pollution Control Act
OZEU	Organic Zinc Epoxy Urethane
PAT	Project Average Thickness (concrete test)
PAV	Pressure Aging Vessel (asphalt test)
PB	Polybutylene (conduit)
PCC	Portland Cement Concrete
PCS	Petroleum Contaminated Soil
PDA	Pile Dynamic Analysis (steel piling)
PE	Polyethylene (conduit)
PG	Performance Grade (asphalt binder grading system)
pH	Potential of Hydrogen
PLS	Pure Live Seed
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
QCFS	Quality Control Fabricator Specialist (structures)
QCP	Quality Control Program, or Quality Control Points (steel test)
QPL	Qualified Products List
RAP	Reclaimed Asphalt Pavement
RAS	Reclaimed Asphalt Shingles
RC	Rapid Cure (asphalt emulsion)
REA	Rural Electrification Act
RFI	Radio Frequency Interference (traffic controller)
RH	Relative Humidity
RMS	Root Mean Square (traffic controller)
RPCC	Recycled Portland Cement Concrete
RPM	Raised Pavement Marker (traffic)
RS	Rapid Set (asphalt emulsion)
RTFO	Rolling Thin-Film Oven (asphalt test)
RUS	Rural Utilities Service
SAE	Society of Automotive Engineers
SBA	Styrene Butadiene Amine
SBR	Styrene Butadiene Rubber

SBS	Styrene Butadiene Styrene
SCD	Standard Construction Drawing
SDS	Safety Data Sheets
SF	Standard Fabricated members (structures)
SI	International System of Units (Metric)
SM	AASHTOWare Project Sitemanager ™
SMA	Stone Matrix Asphalt
SPD	Surge Protection Device (traffic controller)
SPST	Single Pole / Single Throw (traffic controller)
SS	Slow Set (asphalt emulsion)
SSD	Saturated Surface Dry (aggregate)
SSPC	Society for Protective Coatings
SWPPP	Storm Water Pollution Prevention Plan
TAP	Traffic Authorized Product
TCE	Trichloroethylene
TMPTA	Tri-methyolpropane Tri-acrylate (paint)
TNP	Total Neutralizing Power
TODS	Tourist-Oriented Directional Signs
TSEC	Temporary Sediment and Erosion Control
TSR	Tensile Strength Ratio (asphalt test)
UF	Unique Fabricated members (structures)
UL	Underwriters' Laboratories, Inc.
USACE	United States Army Corps of Engineers
USC	United States Code
VA	Verification Acceptance
VAC	Volts Alternating Current
VCA	Volume of Coarse Aggregate (asphalt test)
VECP	Value Engineering Change Proposal
VMA	Voids in the Mineral Aggregate
VME	VersaModule Eurocard (traffic controller)
WDT	Watchdog Timer
WEAP	Wave Equation Analysis (steel piling)
WPS	Welding Procedure Specification (steel test)
WZRPM	Work Zone Raised Pavement Marker (traffic)
XCU	Explosion, Collapse and Underground

101.03 Definitions. The following terms or pronouns, when used in the Contract Documents, are defined as follows:

Addenda. Changes or revisions to the Bid Package, made subsequent to the initial advertisement and prior to the bid opening.

Advertisement. The public announcement, as required by law, inviting Bids for Work to be performed or materials to be furnished.

Area Construction Engineer. The duly authorized representative of the Cuyahoga County Department of Public Works acting within the scope of his/her authority for purposes of engineering and administration of the Contract.

Award. The written acceptance by the County of a bid.

Bid. The offer of a Bidder, on the prescribed form properly signed and guaranteed, to perform the Work and to furnish the labor and materials at the prices quoted.

Bidder. An individual, firm or corporation submitting a Bid for the advertised Work.

Bid Due Date. The Calendar Day on which all Proposals/Bids are to be turned into the Department of Purchasing.

Bid Package. Includes the Proposal Package, the Cuyahoga County Engineer Specification Booklet, the Plans, and the Standard Construction Drawings.

Bridge. A structure, including supports, erected over a depression or an obstruction, such as water, a highway, or a railway, and having a track or passageway for carrying traffic or other moving loads and having a length measured along the center of roadway of 20 feet (6.10 m) or more between undercopings of abutments or extreme limits of openings for multiple boxes.

Calendar Day or Day. Every day shown on the calendar.

Certified Test Data. A test report from a manufacturer's or an independent laboratory approved by the Engineer listing actual test results of samples tested for compliance with specified contract requirements. Certified Test Data will be accepted from manufacturers' laboratories if their products have been used satisfactorily on prior Cuyahoga County Department of Public Works or ODOT projects and their test data has been confirmed. The test report shall include a statement that the test data furnished is representative of the material furnished to a Cuyahoga County Department of Public Works or ODOT project, or, to a supplier. The report is identified by number and/or date and identifies the Cuyahoga County Department of Public Works project or supplier to which the material is shipped. The report shall be signed by a person having legal authority to act for the manufacturer or independent laboratory.

Change Order. A written order issued by the Engineer to the Contractor, covering changes to the terms and conditions, plans and/or quantities within or beyond the scope of the Contract and establishing the basis of payment and time adjustments for the Work affected by the changes.

Claims. Unsettled Disputes for which the Contractor has documented the costs and/or time incurred as a result of such Disputes. A Dispute becomes a Claim when the Contractor submits a Notice of Claim.

Clarification. An explanation of (or reference to) an item in the Bid Package, made subsequent to the initial advertisement and prior to the bid opening, that is considered to be necessary for the purpose of fair and consistent bidding.

Completion Date. The date, as shown in the Contract Documents, on which the Work contemplated shall be completed.

Construction Limits. These limits must encompass all Work. This includes removals, room for construction equipment to complete work, site access, etc.

Contract. The written agreement between the County and the Contractor setting forth the obligations of the parties, including, but not limited to, the performance of the Work and the basis of payment.

Contract Documents. The Contract Documents include the Invitation for Bids, Addenda, Legal Notice to Bidders, Instructions to Bidders, Required Bid Documents, Cuyahoga County Department of Public Works Construction Proposal Form including the Itemized Unit Price Bid Sheets, Non-Collusion Affidavit, Bid Guaranty, Work Types Worksheet, Required Small Business Enterprise Forms (for non-federally funded projects only), Sample Contract Forms, Cuyahoga County Form of Agreement Unit Price Contract, Bond of Contractor (Performance and Payment),Wage Determination Schedule, Bidder’s Manual (Small Business Enterprise Goal, for non-federally funded projects only), Cuyahoga County Engineer General Provisions, Special Provisions, Supplemental Specifications, Proposal Notes, Plans, Standard Construction Drawings, binding correspondence, Change Orders, Supplemental Agreements, Extra Work Contracts, “Accepted” and “Accepted as Noted” Working Drawings, and any and all other documents designated by the County as a Contract Document that over the course of the Contract Time, are required to complete the Work in an acceptable manner. Together, all of the Contract Documents constitute one instrument.

Contract Item (Pay Item). A specifically described unit of Work for which a price is provided in the Contract.

Contract Price. The amount of compensation bid by the Contractor for a Contract Item in the Proposal or the amount of compensation established for a Contract Item added or modified pursuant to the Contract Documents.

Contract Time. The number of workdays or calendar days, including authorized adjustments, allowed for completion of the Project. When a specified Completion Date is shown in the Contract Documents instead of the number of workdays or calendar days, completion of the Project shall occur on or before that date. Specified Completion Date and Calendar Day Contracts shall be completed on or before the day indicated even when that date is a Saturday, Sunday, or holiday.

Contractor. The individual, firm or corporation contracting with the County for performance of prescribed Work, acting directly or through a duly authorized representative.

County. Cuyahoga County

Culvert. Any structure not classified as a bridge which provides an opening under the roadway.

Department. The Cuyahoga County Department of Public Works.

Director. The Cuyahoga County Director of Public Works or his/her duly authorized agent.

Disputes. Disagreements, matters in question and differences of opinion between the Cuyahoga County Department of Public Works' personnel and the Contractor that may include a request for additional money and/or time.

District Testing. Any Laboratory Designated by the County.

Engineer. A representative of the Cuyahoga County Department of Public Works acting within the scope of his/her authority for purposes of engineering and administration of the Contract.

Engineered Drawings. A type of Working Drawing that requires the practice of engineering as defined in ORC 4733.01(E). Examples of Engineered Drawings include: Excavation Bracing Plans, Demolition Plans, Erection Plans, Falsework Plans, Cofferdam Plans, Causeway Plans, Jacking and Temporary Support Plans, Plans for Heavy Equipment on Structures, Plans for structures for Maintaining Traffic, and Corrective Work Plans.

Equipment. All machinery and equipment, together with the necessary supplies for upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the Work.

Extra Work. An item of Work not provided for in the Contract as awarded but found essential to the satisfactory completion of the Contract within its intended scope.

Extra Work Contract. A Contract or supplemental agreement concerning the performance of Work or furnishing of materials involving Extra Work. Such Extra Work may be performed at agreed prices or on a force account basis and shall be subject to the provisions of Section 5555.69 of the ORC and the Cuyahoga County Code.

Fabricator. The individual, firm, or corporation that fabricates structural metals or prestressed concrete members as an agent of the Contractor.

Final Inspector. The Area Construction Engineer, or an Engineer appointed by the Cuyahoga County Director of Public Works, or the Area Construction Engineer, who inspects the completed Work and accepts it if it complies with the Contract Documents.

Inspector. The Engineer's authorized representative assigned to make detailed inspections of Contract performance.

Invitation for Bids. The invitation for Proposals for all Work on which Bids are required. Such Proposal will indicate with reasonable accuracy the quantity and location of the Work to be done or the character and quality of the material to be furnished and the time and place of the opening of Proposals.

Laboratory. Any Laboratory Designated by the County.

Materials. Any materials or products specified for use in the construction of the Project and its appurtenances.

Ohio Department of Transportation (ODOT). The Ohio Department of Transportation.

Partnering. A collaborative process for project cooperation and communication meant to achieve effective and efficient contract performance and completion of the Project within budget, on schedule, safely and with requisite quality in accordance with the Contract.

Performance and Payment Bond. The approved form of security, per ORC Section 153.57 or 153.571, executed by the Contractor and his sureties, which guarantee the complete execution of the Contract, and, all supplemental agreements pertaining thereto, including the payment of all legal debts pertaining to the Contract.

Plans. The drawings, standard construction drawings and supplemental drawings provided by the Cuyahoga County Department of Public Works and Cuyahoga County that show the location, character, dimensions, and details of the Work.

Prebid Question. A written inquiry submitted by a prospective Bidder.

Profile Grade. The trace of a vertical plane intersecting the top surface of the proposed wearing surface, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.

Project. The specific section of the highway together with all appurtenances and Work to be performed thereon under the Contract.

Project Limits. Project limits are points on the mainline centerline of construction where the proposed improvement, as described in the project description on the Title Sheet (excluding incidental construction), begins and ends.

Project Right-of-Way. That portion of the Right-of-Way between the beginning and end of the Project.

Proposal. A Bidder’s written offer to perform the stated Work at the quoted prices provided on forms furnished by the Cuyahoga County Department of Public Works.

Proposal Form. The approved form on which the Cuyahoga County Department of Public Works requires Bids to be prepared and submitted for the Work.

Proposal Guaranty. The security furnished with a Bid in accordance with ORC Section 153.54 to guarantee that the Bidder will enter into the Contract if their Bid is accepted.

Proposal Package. Includes the “Legal Notice to Bidders”, “Instructions to Bidders”, “Required Bid Documents”, “Sample Contract Forms”, “Wage Determination Schedule”, and, for non-federally funded projects, the Cuyahoga County Bidders’ Manual for the Small Business Enterprise Goal.

Reasonably Close Conformity. Reasonably close conformity means compliance with reasonable and customary manufacturing and construction tolerances where working tolerances are not specified. Where working tolerances are specified, reasonably close conformity means compliance with such working tolerances.

Without detracting from the complete and absolute discretion of the Engineer to insist upon such tolerances as establishing reasonably close conformity, the Engineer may accept variations beyond such tolerances as reasonably close conformity where they will not materially affect the value or utility of the Work and the interests of the Cuyahoga County Department of Public Works.

Registered Engineer. An engineer registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional engineering in the State of Ohio.

Registered Surveyor. A surveyor registered with the Ohio State Board of Registration for Professional Engineers and Surveyors to practice professional surveying in the State of Ohio.

Right-of-Way. A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a highway.

Road. A general term denoting a public way for purposes of vehicular travel, including the entire area within the Right-of-Way, as defined in ORC 5555.01.

Roadbed. The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulder.

Roadside. The areas between the outside edges of the shoulders or curbs and the Right-of-Way boundaries. Unpaved median areas between inside shoulders or curbs of divided highways and infield areas of interchanges are included.

Roadside Development. Those items necessary to the highway that provide for the preservation of landscape materials and features; the rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching and the placing of other ground covers; such suitable planting, and other improvements as may increase the effectiveness and enhance the appearance of the highway.

Roadway. The portion of a highway within the limits of construction.

Shop Drawings. Drawings accepted by the Contractor and submitted to the County that describe portions of the Work fabricated off site that are incorporated permanently with the project. County acceptance is not required.

Shoulder. The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and/or for lateral support of base and surface courses.

Sidewalk. That portion of the roadway primarily constructed for the use of pedestrians.

Signatures on Contract Documents. All signatures on Contract Documents must meet the requirements of 102.06.

Special Provisions. Additions and revisions to the Standard and Supplemental specifications covering conditions peculiar to an individual Project.

Specifications. The directions, provisions and requirements contained herein and in the latest edition of ODOT CMS and as supplemented by the Supplemental Specifications, Proposal Notes and Special Provisions.

State. Shall mean Cuyahoga County (the County).

Street. A general term denoting a public way for purpose of vehicular travel, including the entire area within the Right-of-Way.

Structures. Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains and other features which may be encountered in the Work and not otherwise classed herein.

Subcontractor. A qualified individual, firm, or corporation to whom the Contractor sublets part of the Contract to be performed on the job site, who prior to such undertaking receives the written consent of Cuyahoga County.

Subgrade. The portion of a Roadbed upon which the pavement structure and shoulders are constructed.

Substructure. All of that part of the structure below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with backwalls and wings.

Superintendent. The Contractor's authorized representative in responsible charge of the Work.

Superstructure. The entire structure except the Substructure.

Supplement. A list of requirements for fabrication plants, methods of test, or other miscellaneous requirements which are maintained on file in the Cuyahoga County Department of Public Works.

Supplemental Agreement. A written agreement executed by the Contractor and by Cuyahoga County covering necessary alterations.

Supplemental Specifications. Detailed specifications supplemental to or superseding these specifications and/or the ODOT Construction and Material Specifications.

Surety. The corporation, partnership or individual, other than the Contractor, executing a bond furnished by the Contractor.

Titles (or Headings). The titles or headings of the sections and subsections herein and in the ODOT CMS are intended for convenience of reference and shall not be considered as having any bearing on their interpretation.

Waters of the United States. Waters that are under the jurisdiction of the Corps of Engineers under the Clean Water Act as defined by 33 CFR Ch. II Part 328, which as applied to Ohio means: the Ohio River and Lake Erie and any other river, stream, creek, lake, pond, or wetland that drains directly or indirectly into the Ohio River or Lake Erie.

Work. All labor, materials, equipment, tools, transportation, supplies, and other incidentals and all tasks that comprise the Project or any portion thereof, as described by the Contract Documents.

Workday. A calendar day that the Contractor normally works.

Working Drawings. Contractor submitted drawings for work, not otherwise defined in the Bid Documents, and require County approval. Examples of Working Drawings include: Engineered Drawings, installation plans, certified drawings, and any other supplementary plans or similar data that the Contractor is required to submit for approval.

Work Limits. Work Limits are the extreme limits of the Contractor’s responsibility on a project, including all temporary and incidental construction, with the exception of work zone traffic control devices required for maintenance of traffic.

101.04 Interpretations. In order to avoid cumbersome and confusing repetition of expressions in these general provisions and the ODOT CMS, it is provided that whenever anything is, or is to be, done, if, as, or, when, or where "contemplated, required, determined, directed, specified, authorized, ordered, given, designated, indicated, considered necessary, deemed necessary, permitted, reserved, suspended, established, approval, approved, disapproved, acceptable, unacceptable, suitable, accepted, satisfactory, unsatisfactory, sufficient, insufficient, rejected, or condemned," it shall be understood as if the expression were followed by the words "by the Engineer" or "to the Engineer."

102 BIDDING REQUIREMENTS AND CONDITIONS

102.01 Prequalification of Bidders.

Bidders shall refer to the Instructions to Bidders found in Section 2 of the Proposal Package for Bidder qualification requirements.

102.02 Contents of Cuyahoga County Bid Package.

The Bid Package, which includes the Proposal Package, Plans, Cuyahoga County Engineer Specification Booklet, and Standard Construction Drawings may be obtained from the Department of Purchasing, 2079 East 9th Street, 2nd Floor, Cleveland, Ohio 44115 for the fee stated in the Legal Notice to Bidders. The Proposal Package includes the Legal Notice to Bidders, Instructions to Bidders, Required Bid Documents, Sample Contract Forms, the Wage Determination Schedule, and, for non-federal aid projects, the Cuyahoga County Bidders' Manual for the Small Business Enterprise Goal. The Required Bid Documents contain the Cuyahoga County Department of Public Works Construction Proposal Form along with the Itemized Unit Price Bid Sheets which include the Cuyahoga County Department of Public Works': Total Estimated Cost", the location and description of the contemplated construction and the approximate estimate of the various quantities and kinds of Work to be performed or materials to be furnished, and upon which unit bid prices are invited. The Proposal Package will state the date on which the Work must be completed, the amount of the proposal guaranty, and the date, time, and place of the opening of Proposals. The Cuyahoga County Engineer Specification Booklet includes these General Provisions, any Special Provisions, Supplemental Specifications, Proposal Notes or other requirements, which vary from or are not contained in the plans and specifications.

The plans, specifications and other documents designated in the Bid Package will be considered a part of the Bid Package whether attached or not.

102.03 Issuance of Proposals.

Cuyahoga County reserves the right to disqualify or refuse to consider a Proposal if a Bidder is in default for any of the following reasons:

(a) Lack of competency and adequate machinery, plant, and other equipment, as revealed by the information required or requested under 102.01.
(b) Uncompleted Work which, in the judgment of the Cuyahoga County Department of Public Works, might hinder or prevent the prompt completion of additional Work if awarded.
(c) Failure to comply with any qualification regulation of Cuyahoga County or the Cuyahoga County Department of Public Works.
(d) Default under previous contracts.
(e) The prospective Bidder is debarred from bidding or is currently in the debarment process of the Ohio Department of Transportation.
(f) Failure to comply with the Cuyahoga County Code, including, but not limited to, the County's Ethics policy and the County's Contracting and Purchasing Procedures policy. The Cuyahoga County Code is available at http://code.cuyahogacounty.us.

102.04 Interpretation of Quantities in Proposal.

The quantities appearing in the Proposal are approximate only and are prepared for the comparison of Bids. The Cuyahoga County Department of Public Works does not assume any responsibility that the quantities will actually be required in the project construction, nor will the Contractor be allowed to plead misunderstanding or deception because of the quantity estimates or because of the character of the Work, the location, or other conditions. Payment to the Contractor will be made only for the actual quantities of Work performed and accepted or materials furnished and accepted in accordance with the contract except for lump sum Contracts, and except for lump sum items in unit price Contracts. The scheduled quantities of Work to be done and materials to be furnished may each be increased, decreased, or eliminated as determined by the Cuyahoga County Department of Public Works. No claim shall be made by the Contractor for any loss of anticipated

profits because of any alteration or variation between the approximate quantities and the quantities of Work as done.

102.05 Examination of Bid Package and Project Site and Submission of Prebid Questions.

The Contractor shall carefully examine the Bid Package and perform a reasonable site investigation before submitting a Bid. Submitting a Bid is an affirmative statement that the Bidder has investigated the Project site and is satisfied as to the character, quality, quantities, and the conditions to be encountered in performing the Work. A reasonable site investigation includes investigating the Project site, borrow sites, hauling routes, and all other locations related to the performance of the Work.

When available, the County will include in the Contract Documents or provide for the Bidder's review at the Cuyahoga County Department of Public Works office or other offices, one or more of the following:

A. Record drawings.

B. Available information relative to subsurface exploration, borings, soundings, water levels, elevations, or profiles.

C. The results of other preliminary investigations.

A reasonable site investigation includes a review of these documents.

Should a question arise at any time during the examination of Bid Documents or investigation of the site the Bidder may seek clarification by submitting a Prebid Question. Submit all Prebid Questions in writing via fax or e-mail as indicated in the Section 2 Instructions to Bidders of the Proposal Package (2.09 Interpretation of the Bid Package). The Cuyahoga County Department of Public Works' responses to Prebid Questions will also be as indicated in the Section 2 Instructions to Bidders of the Proposal Package (2.09 Interpretation of the Bid Package). The Cuyahoga County Department of Public Works will respond to all questions submitted before a deadline of 10:00 A.M. four working days prior to the public opening of Bids. Responses to Prebid Questions are not revisions to the Bidding Documents and are not binding. The Cuyahoga County Department of Public Works is not obligated to respond to, or otherwise act upon, a Prebid Question submitted after this deadline, but reserves the right to act upon any information received.

102.06 Preparation of Proposal.

A. The Bidder shall submit his/her Proposal on the Cuyahoga County Department of Public Works Construction Proposal Form prepared by the Cuyahoga County Department of Public Works. All the words and figures shall be in ink or typed.

   To complete the "Itemized Unit Price Bid Sheets" the Bidder shall enter a unit price bid in the "Unit Price Bid" column for each item for which there is a quantity given in the "Estimated Quantity" column, except for "Item 832 – Erosion Control", where the "Unit Price Bid" and the "Total Amount Bid" have been provided. The Bidder shall enter a unit price for each item. Failure to do so will render the Proposal informal at the discretion of Cuyahoga County. To determine the total amount bid for each item, the Bidder shall multiply the unit price bid for each item against the estimated quantity given. The figure arrived at through this multiplication shall then be placed in the "Total Amount Bid" column for that item. Where the estimated quantity for an item is designated as "Lump", the Bidder shall enter his/her lump sum bid for that item in the "Unit Price Bid" column as well as in the "Total Amount Bid" column. To determine the "Section Total" the Bidder shall add all figures in the "Total Amount Bid" column for each item in that section and the sum shall be entered on the corresponding "Section Total" line. For example, the "Section Total Roadway" is the sum of the "Total Amount Bid" column for all Roadway items. The sum of the Section Totals and the already provided "General Contingency for Unforeseen Conditions" shall be entered as the "Grand Total Bid". When the Proposal includes Alternate Bid Item(s), the Bidder shall enter a "Unit Price Bid" and a "Total Amount Bid" for each Alternate Bid Item listed.

Failure to do so will render the Proposal informal at the discretion of Cuyahoga County. The Bidder's Grand Total Bid, excluding the Alternate Bid Item(s), shall in no case exceed the Cuyahoga County Department of Public Works' "Total Estimated Cost" by more than ten (10) percent. Any Bid that exceeds the "Total Estimated Cost" by more than ten (10) percent will be deemed informal and unacceptable.

When an item in the Proposal contains a choice to be designated by the Bidder, the Bidder shall indicate his/her choice in accordance with the specifications for that particular item, and thereafter no further choice will be permitted.

The Proposal shall include a properly executed Non-collusion Affidavit.

The bidder's Proposal must be signed with ink by the individual, by one or more members of the partnership, by one or more members or officers of each firm representing a joint venture, by one or more officers of a corporation, or by an agent of the Bidder legally qualified and acceptable to Cuyahoga County. If the Proposal is made by an individual, his/her name and business address must be shown; by a partnership, the name and business address of each partnership member must be shown; as a joint venture, the name and business address of each member or officer of the firms represented by the joint venture must be shown; by a corporation, the name of the state under the laws of which the corporation is chartered and the name and title of the officer or officers having authority under the bylaws to sign contracts, the name of the corporation and the business address of its corporate officials must be shown. Anyone signing a Proposal as an agent shall file legal evidence of his/her authority to do so.

B. Proposals will be considered irregular and may be rejected for the following reasons:

(a) If the Proposal is on a form other than that furnished by the Cuyahoga County Department of Public Works; or if the form is altered or any part thereof is detached.
(b) If there are unauthorized additions, conditional or alternate Bids, or irregularities of any kind which may tend to make the Proposal incomplete, indefinite, or ambiguous as to its meaning.
(c) If the Bidder adds any provisions reserving the right to accept or reject an award, or to enter into a Contract pursuant to an award. This does not exclude a Bid limiting the maximum gross amount of awards acceptable to any one Bidder at any one bid letting, provided that any selection of awards will be made by Cuyahoga County.
(d) If the Proposal does not contain a unit price for each pay item listed except in the case of authorized alternate pay items or lump sum items.
(e) If the Cuyahoga County Department of Public Works determines that any of the unit bid prices are significantly unbalanced to the potential detriment of Cuyahoga County or the Cuyahoga County Department of Public Works, the Proposal will be rejected.
(f) If the Proposal is not properly signed.
(g) If the Proposal is not typed or in ink.

102.07 Duty to Notify of Errors in Bid Package.

Notify the County of errors and omissions in the Bid Package. Make notification by submitting a question in the manner described in 102.05. The Contractor's duty to disclose errors and omissions is not only a bidding requirement but is also a legal requirement that cannot be ignored.

Failure to provide the required notification prior to the opening of bids shall constitute a waiver by the Contractor and does not obligate the County for any costs based upon any apparent or patent ambiguity arising from insufficient data or obvious errors in the Bid Package. Knowingly withholding information regarding an error or omission in the Bid Package, or intentionally misrepresenting an item of Work for financial or competitive gain may result in civil or criminal penalties in excess of the value of the item bid.

102.08 Unbalanced Bidding.

Bid all items correctly and price each quantity as indicated in the Bid Package. The County will reject a Mathematically Unbalanced Bid if the Bid is also Materially Unbalanced. A Mathematically Unbalanced Bid is a Bid containing lump sum or unit price items that do not include reasonable labor, equipment, and material

costs plus a reasonable proportionate share of the Bidder's overhead costs, other indirect costs, and anticipated profit. A Materially Unbalanced Bid is when the County determines that an award to the Bidder submitting a Mathematically Unbalanced Bid will not result in the lowest ultimate cost to the County.

102.09 Proposal Guaranty.

No Proposal will be considered unless accompanied by a Bid Guaranty as required in the Proposal Package.

102.10 Delivery of Proposals.

Proposals containing all documents required by the Instructions to Bidders in the Proposal Package must be delivered in a sealed envelope addressed to the address listed in the Section 1 Legal Notice to Bidders (see Proposal Package).

The Project Name, Requisition Number and Bid Due Date, all as stated in the Proposal Package, and the Bidder's name and address shall be clearly marked on the outside of the sealed envelope. The sealed envelope must be deposited in the bid box located in the Department of Purchasing at the above address by two o'clock in the afternoon (2:00 P.M.) local time on the Bid Due Date, at which time and place the Proposals will be publicly opened and read aloud in accordance with the Legal Notice to Bidders duly published. Proposals received after the time for opening of bids will be returned to the Bidder unopened. The County will return all Proposals not prepared and submitted in accordance with the Proposal Package.

102.11 Withdrawal of Proposals.

A Bidder may withdraw his/her Proposal, provided a request in writing is received in the Department of Purchasing of Cuyahoga County prior to the time set for opening Proposals as indicated in the Legal Notice to Bidders. When a withdrawn Proposal is reached at the Proposal opening, it will be returned to the Bidder unopened. A Bidder may also withdraw a Proposal pursuant to the provisions of ORC Section 9.31 or 153.54(G). Any Bidder for whom a request to withdraw its Bid is approved by the County will not be permitted to participate in any manner in a contract awarded for that project for which the Bid was withdrawn.

102.12 Combination or Conditional Proposals.

If Cuyahoga County so elects, Proposals may be issued for projects in combination and/or separately, so that Bids may be submitted either on the combination or on separate units of the combination. Cuyahoga County reserves the right to make awards on combination Bids or separate Bids to the best advantage of Cuyahoga County. No combination Bids, other than those specifically set up on the Proposals by Cuyahoga County, will be considered. Separate contracts will be written for each individual Project included in the combination.

102.13 Public Opening of Proposals.

Proposals will be opened and read publicly at the time and place designated in the Proposal Package. Bidders, their authorized agents, and other interested parties are invited to be present.

102.14 Disqualification of Bidders.

The County will declare a Bid non-responsive and ineligible for award when any of the following occur:

A. The Bidder lacks sufficient prequalification work types or dollars to be eligible for award.
B. The Bidder fails to furnish the required Proposal Guaranty in the proper form and amount.
C. The Bid contains unauthorized alterations or omissions.
D. The Bid contains conditions or qualifications not provided for in the Bid Package.
E. The Proposal is not prepared as specified.
F. A single entity, under the same name or different names, or affiliated entities submits more than one Bid for the same Project.
G. The Bidder fails to submit a unit price for each contract item listed, except for lump sum items where the Bidder may show a price in the "Bid Amount" column for that item.
H. The Bidder fails to submit a lump sum price where required.

I. The Bidder is debarred by the County or the Ohio Department of Transportation from submitting Bids.
J. The Bidder has defaulted, has had a Contract terminated for cause by the County, has either agreed not to Bid or has had debarment proceedings initiated against the Bidder's company and/or its key personnel by the Ohio Department of Transportation.
K. The Bidder submits its Bid or Proposal Guaranty on forms other than those provided by the County.
L. The Bidder fails to submit properly completed Required Bid Documents inclusive of signatures and notarization.
M. The Bidder submits a Materially Unbalanced Bid as defined by 102.08.
N. The Bidder fails to acknowledge addenda.
O. The County finds evidence of collusion. Participants in such collusion will receive no recognition as Bidders for any future Work from Cuyahoga County until any such participant has been reinstated as a qualified Bidder.
P. Any other omission, error, or act that, in the judgment of the County, renders the Bidder's bid non-responsive.
Q. Proposals may be rejected if they show any alterations of forms, additions not called for, conditional Bids, incomplete Bids, or irregularities of any kind. Cuyahoga County reserves the right to waive any informality in the Proposal and to reject any or all Bids.

102.15 Material Guaranty.

Before any Contract is awarded, the County may require the Bidder to furnish a complete statement of the origin, composition, and manufacture of any or all materials to be used in the construction of the Work together with samples. The County may test the samples as specified in these Specifications to determine their quality and fitness for the Work.

102.16 Certificate of Compliance with Affirmative Action Programs.

Before any Contract is awarded, Cuyahoga County will require the Bidder to furnish a valid Certificate of Compliance with Affirmative Action Programs, issued by the State EEO Coordinator.

102.17 Drug-Free Safety Program.

During the life of this project, the Contractor and all its Subcontractors, that provide labor on the Project site, must be enrolled in, and remain in good standing in the Ohio Bureau of Worker's Compensation ("OBWC") Drug-Free Safety Program ("DFSP"), or a comparable program approved by the OBWC.

In addition to being enrolled in and in good standing in an OBWC-approved DFSP or a comparable program approved by the OBWC, the County requires each Contractor and Subcontractor that provides labor, to subject its employees who perform labor on the project site to random drug testing of five (5) percent of its employees. The random drug testing percentage must also include the on-site supervisors of the Contractors and Subcontractors. Upon request, the Contractor and Subcontractor shall provide evidence of this required testing to the County.

Each Subcontractor shall require all lower-tier Subcontractors that provide labor on the project site with whom the Subcontractor is in contract for the Work to be enrolled in and be in good standing in the OBWC-approved DFSP prior to a lower-tier Subcontractor providing labor at the Site.

Cuyahoga County will declare a bid non-responsive and ineligible for award if the Contractor is not enrolled and in good standing in the Ohio Bureau of Worker's Compensation Drug-Free Safety Program (DFSP) Discount Program or a similar program approved by the Bureau of Worker's Compensation within eight (8) days of the bid opening. Furthermore, the County will deny all requests to sublet when the Subcontractor does not comply with the provisions of this section.

Failure of the Contractor to require a Subcontractor to be enrolled in and be in good standing in an OBWC-approved DFSP prior to the time that the Subcontractor provides labor at the Site, shall result in the Contractor being found in breach of the Contract and that breach shall be used in the responsibility analysis of that Contractor or the Subcontractor who was not enrolled in a program for future contracts with Cuyahoga County for five (5) years after the date of the breach.

103 AWARD AND EXECUTION OF CONTRACT

103.01 Consideration of Proposals.

After the proposals are opened and read, they will be compared on the basis of the summation of the products of the approximate quantities shown in the proposal by the unit bid prices. In the event of a discrepancy between unit bid prices and extensions thereof, the unit bid price shall govern.

The right is reserved to reject any or all proposals, to waive technicalities or to advertise for new proposals, if in the judgment of Cuyahoga County their best interests will be promoted thereby.

103.02 Award of Contract.

The award of the contract, if it be awarded, will be made to the lowest and responsive bidder whose proposal complies with all the requirements contained in the Bid Package. In accordance with ORC 153.12, the award and execution of the contract shall be made within 60 calendar days after the date on which the bids are opened. The failure to award and execute the contract within 60 days invalidates the entire bid proceedings and all bids submitted, unless the time for awarding and executing the contract is extended by mutual consent of the County and the bidder whose bid the County accepts. In no case will an award be made until all necessary investigations are made as to the responsiveness and responsibility of the bidder to whom it is proposed to award the contract. The Cuyahoga County Department of Public Works will send a Notice of Award letter and Contract Documents by certified mail to the successful bidder, at the address shown on his/her proposal, indicating that his/her bid has been accepted and that he/she has been awarded the contract. The successful bidder may elect to pick up the Notice of Award letter and Contract Documents in person at the Cuyahoga County Department of Public Works' office and sign an acknowledgement of receipt.

No award will be made for a sum greater than the Cuyahoga County Department of Public Works' estimated cost of the improvement plus 10 percent of such estimated cost.

103.03 Cancellation of Award.

Cuyahoga County may cancel a Contract award at any time before all parties sign the Contract without liability to Cuyahoga County.

103.04 Return of Bid Guaranty.

Bid Guaranties filed pursuant to division (A) of ORC section 153.54 shall be returned to all unsuccessful bidders immediately after the contract is executed. A bid guaranty filed pursuant to division (A)(2) of ORC section 153.54 shall be returned to the successful bidder upon filing of the bond required in division (C) of ORC section 153.54.

103.05 Requirement of Performance and Payment Bond.

If the successful bidder's bid guaranty was filed pursuant to division (A)(2) of ORC section 153.54, then the successful bidder shall furnish a Performance and Payment Bond in accordance with ORC section 153.57. The Performance and Payment Bond shall be furnished prior to execution of the contract, and within 10 days of receiving the Notice of Award, as required in ORC section 153.54(D). The Performance and Payment Bond shall be in a sum equal to 100% of the amount of the contract, payable to the Treasurer of Cuyahoga County and executed by a Surety Company authorized to do business in the State of Ohio.

If the successful bidder's bid guaranty was in the form of a bid bond filed pursuant to division (A)(1) of ORC section 153.54, it shall automatically increase to a 100% Performance and Payment Bond. All cost associated with obtaining the Bonds noted above shall be considered incidental to the contract.

All bonds must be signed by the authorized agent of an acceptable Surety Bonding Company and by the bidder. (Affix corporate seals)

Surety bonding company bonds must be supported by credentials showing the power of attorney of the agent, a certificate showing the legal right of the Bonding Company to do business in the State of Ohio, and a financial statement of the Surety.

103.06 Execution of Contract.

The contract shall be signed by the successful bidder and returned, together with all other items called for in the Notice of Award letter, within 10 days after the bidder has received notice that the contract has been awarded, as required by ORC section 153.54(D). No proposal shall be considered binding upon Cuyahoga County until the execution of the contract by Cuyahoga County.

103.07 Failure to Execute Contract.

If the successful bidder fails or refuses to enter into a proper contract with Cuyahoga County within ten (10) days after receiving the Notice of Award letter, the bidder and his surety shall be liable to Cuyahoga County as described in ORC section 153.54(D) and 153.54(E).

Failure to execute the contract and provide the required Performance and Payment Bond shall be just cause for the cancellation of the award. Award may then be made to the next lowest responsive bidder, or the project may be resubmitted for bidding, as Cuyahoga County may decide.

104 SCOPE OF WORK

104.01 Intent of Contract.

The intent of the Contract is to provide for the construction and completion in every detail of the Work described. The Contractor shall perform all items of Work covered and stipulated in the proposal and perform altered and Extra Work, furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the Work in accordance with the plans, specifications, and terms of the contract. Should any misunderstanding arise as to the intent or meaning of the plans, specifications, special provisions or proposal, or any discrepancy appear, the decision of the Engineer shall be final and conclusive.

104.02 Revisions to the Contract Documents.

A. General.

The Engineer reserves the right to make, at any time during the work, such increases or decreases in quantities and such alteration in the Work as necessary to satisfactorily complete the project. Such increases or decreases and alterations shall not invalidate the contract nor release the Surety, and the Contractor agrees to perform the Work as increased, decreased or altered.

Increased or altered Work is subject to the rules and limitations of ORC section 5555.69 and the current Cuyahoga County policies relating thereto.

B. Differing Site Conditions.

During the progress of the Work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the Contract Documents or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the Work provided for in the Contract Documents, are encountered at the site, notify the Engineer as specified in 108.02.F of the specific differing conditions before they are disturbed or the affected Work is performed.

Upon notification, the Engineer will investigate the conditions and if it is determined that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any Work under the Contract, the County will make an adjustment and modify the Contract as specified in 108.06 and 109.05. The Engineer will notify the Contractor of the determination whether or not an adjustment of the Contract is warranted.

C. Suspension of Work**.**

If the performance of all or any portion of the Work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the Contractor believes that additional compensation or time is due as a result of such suspension or delay, notify the Engineer as specified in 108.02.F.

Upon receipt of notice, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost or time required for the performance of the Work has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an equitable adjustment (excluding profit) and modify the contract as specified in 108.06 and 109.05. The Engineer will notify the Contractor of its determination whether or not an adjustment to the Contract Documents is warranted. Failure of the Engineer to suspend or delay the Work in writing does not bar the Contractor from receiving a time extension or added compensation according to 108.06 or 109.05.

The County will not make an adjustment under this subsection in the event that performance is suspended or delayed by any other cause, or for which an adjustment is provided or excluded under any other term or condition of this Contract.

D. Significant Changes in Character of the Work.

The Engineer may increase or decrease quantities and alter the Work as necessary to complete the Project. The Engineer will make appropriate adjustments according to 108.06 and 109.05 if such alterations significantly change the character of the Work.

If the Contractor disagrees as to whether an alteration constitutes a significant change, use the notification procedures specified in 108.02.F.

The term "significant change" is defined as follows:

1. when the character of the Work as altered differs materially in kind or nature from that involved or included in the original proposed construction; or

2. when the product of the quantity in excess of the estimated quantity of a Contract Item and the unit price exceeds the limits set forth in Table 104.02-1.

TABLE 104.02-1

Contract Price	Contract Limits
Up to $500,000	$25,000
$500,001 to $2,000,000	5% of Total Contract Price
Over $2,000,000	$100,000

A quantity underrun is defined as follows:

a. The estimated quantity of a contract item exceeds four units, and

b. The decrease in quantity of any unit price Contract Item exceeds 25 percent of the estimated quantity, and

c. The total of all such adjustments for all Contract Items is more than $400.

Then after the determination of final quantities according to 109.12.C, the Engineer will adjust the unit prices for the affected Contract item by multiplying the bid unit price by the factor obtained from Table 104.02-2.

Table 104.02-2

% Decrease	Factor	% Decrease	Factor	% Decrease	Factor
25	1.08	49	1.24	65	1.46
26 to 27	1.09	50	1.25	66	1.49
28 to 29	1.10	51	1.26	67	1.51
30 to 31	1.11	52	1.27	68	1.53
32 to 33	1.12	53	1.28	69	1.56
34 to 35	1.13	54	1.29	70	1.58
36	1.14	55	1.31	71	1.61
37 to 38	1.15	56	1.32	72	1.64
39	1.16	57	1.33	73	1.68
40 to 41	1.17	58	1.35	74	1.71
42	1.18	59	1.36	75	1.75
43	1.19	60	1.38	76	1.79
44 to 45	1.20	61	1.39	77	1.84
46	1.21	62	1.41	78	1.89
47	1.22	63	1.43	79	1.94
48	1.23	64	1.44	80 and over	2.00

When the increase in quantity or decrease in quantity of any unit price Contract Item does not exceed the limits set forth in Tables 104.02-1 and 104.02-2, the change is considered a minor change. The County will pay for minor changes in the Work at the unit bid price.

E. Eliminated Items.

The County may partially or completely eliminate contract items.

The County will only make an adjustment to compensate the Contractor for the reasonable cost incurred in preparation to perform significantly changed work as set forth in 104.02.D or work completely eliminated prior to the date of the Engineer's written order to significantly change or completely eliminate the Work. The adjustment will be determined according to 109.04 and 109.05. Such payment will not exceed the price of the Contract Item.

Any adjustment in contract time because of changes will be made in accordance with the provisions of 108.06.

The County will not seek a savings for maintaining traffic, mobilization, and construction layout stakes items for Eliminated Items of Work, unless there is a significant change.

F. Extra Work.

The Contractor shall perform Extra Work in accordance with the specifications and as directed by the Engineer. Extra Work will be paid for as provided under 109.05. Time extensions, if warranted, will be determined according to 108.06.

No Extra Work shall be performed before Cuyahoga County has entered into a Supplemental Agreement in writing for such Extra Work as required by ORC section 5555.69. The provisions of this section are subject to the rules and limitations of ORC section 5555.69 and current Cuyahoga County policies relating thereto.

G. Unilateral Authority to Pay.

The County has unilateral authority to pay the Contractor sums it determines to be due to the Contractor for work performed on the project. This unilateral authority to pay by the County does not preclude or limit the rights of the County and the Contractor to negotiate and agree to the amounts to be paid to the Contractor.

104.03 Rights in and Use of Materials Found on the Work.

The Contractor, with the approval of the Engineer, may use on the project such stone, gravel, sand, or other material determined suitable by the Engineer as may be found in the excavation and will be paid both for the excavation of such materials at the corresponding contract unit price and for the pay item for which the excavated material is used. He/She shall replace at his/her own expense with other acceptable material all of that portion of the excavation material so removed and used which was needed for use in the embankments, backfills, approaches, or otherwise. No charge for the materials so used will be made against the Contractor. The Contractor shall not excavate or remove any material from within the highway location which is not within the grading limits, as indicated by the slope and grade lines, without written authorization from the Engineer.

Unless otherwise provided, the material from any existing old structure may be used temporarily by the Contractor in the erection of the new structure. Such material shall not be cut or otherwise damaged except with the approval of the Engineer.

The Contractor shall obtain written permission from the Engineer according to 107.11 (A)

104.04 Cleaning Up.

The Contractor shall maintain the project in a presentable condition. The highway, including stream channels and banks within the right-of-way at drainage structures, and all borrow and waste areas, storage sites, temporary plant sites, haul roads and other ground occupied by the Contractor in connection with the Work shall be cleaned of all rubbish, excess materials, temporary structures, and equipment. These areas shall have suitable vegetative cover established by seeding and mulching in accordance with 659 and all parts of the Work shall be left in a condition acceptable to the Engineer. The cost of cleanup shall be incidental to other items and no separate payment shall be made, however, ten percent of the payment for the mobilization item, if included, will be withheld until performance under this section is complete. See 624.04 (C).

105 CONTROL OF WORK

105.01 Authority of the Engineer.

The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and quantity of Work performed and as to the rate of progress of the Work; all questions which may arise as to the interpretation of the Contract Documents; all questions as to the acceptable fulfillment of the contract on the part of the Contractor, and as to compensation.

The Engineer will have the authority to suspend the Work wholly or in part due to the failure of the Contractor to correct conditions unsafe for the workers or the general public, for failure to carry out provisions of the contract and to carry out orders. The Engineer may suspend the Work for such periods as deemed necessary due to adverse weather conditions, for conditions considered adverse to the prosecution of the Work or for any other condition or reason deemed to be in the public interest.

The Engineer's acceptance does not constitute a waiver of the County's right to pursue any and all legal remedies for defective work or work performed in an un-workman like manner.

105.02 Plans and Working Drawings.

The plans show details of structures, the lines, grades, typical cross sections of the roadway and the location and design of structures. The Contractor shall keep one set of project plans available at the project site.

The plans shall be supplemented by working drawings when required to control the Work adequately. Working drawings shall be furnished by the Contractor. No changes shall be made to the plans or working drawings except as approved by the Engineer.

Specific items of Work shall require working drawings. These requirements are stated in the specification section that is applicable to the item of Work. Working drawing shall not be prepared until the applicable field and plan elevations, dimensions, and geometries have been verified by the Contractor. Where Work consists of repairs, extension, or alteration of existing structures, the Contractor shall make such measurements of original construction as may be required to accurately join old and new Work. Any measurements which may appear upon the plans to indicate the extent and nature of such repair or extension shall not relieve the Contractor of this responsibility.

Unless otherwise indicated, working drawings will be reviewed by the Engineer for conformance with the contract. Following the Engineer's review of each submittal of working drawings, the Engineer will indicate his/her action taken in response to the submittal by a written response to the Contractor showing action as follows:

A. "ACCEPTED", which means accepted for construction, fabrication, or manufacture, subject to the provision that the Work shall be in accordance with the requirements of the contract. Final acceptance of the Work shall be contingent upon such compliance;

B. "ACCEPTED AS NOTED", which means unless otherwise noted on the drawings approved for construction, fabrication, or manufacture, subject to the provision that the Work shall be carried out in compliance with all comments or corrections indicated and in accordance with requirements of the contract. Final acceptance of Work shall be contingent upon such compliance. If also marked "RESUBMIT", accepted as noted is valid, and a corrected submittal of the drawings is required; or

C. "NOT ACCEPTED." The County does not accept the submittal. The submittal does not conform to Contract requirements. Do not begin construction, fabrication, or manufacture of Work included in the submittal. Revise the submittal to comply with County comments or corrections and Contract requirements and provide the revised submittal to the County for another review.

"Accepted and "Accepted as Noted" Working Drawings are Contract Documents as defined in 101.03. The Engineer's acceptance will not relieve the Contractor of responsibility to complete the Work according to the Contract nor relieve a signatory engineer's responsibility as defined by OAC 4733-23. Any Work done, or materials ordered prior to the approval of such working drawings shall be at the sole risk of the Contractor. Include the cost of furnishing Working Drawings in the contract unit price for the contract items (Work) they cover.

105.03 Conformity with Contract Documents.

All Work performed, and all materials furnished shall be in reasonably close conformity with the lines, grades, cross sections, dimensions, and material requirements shown on the plans or indicated in the specifications.

In the event the Engineer finds the materials or the finished product in which the materials are used not within reasonably close conformity with the plans and specifications, but that reasonably acceptable Work has been produced, he/she shall then make a determination if the Work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification which will provide for an appropriate adjustment in the contract price for such Work or materials as he/she deems necessary to conform to his/her determination based on engineering judgment.

In the event the Engineer finds the materials or the finished product in which the materials are used, or the Work performed are not in reasonably close conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the Work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.

105.04 Coordination of the Contract Documents. The Contract Documents are those defined in 101.03. A requirement appearing in one of these documents is as binding as though it occurs in all. The Engineer will resolve discrepancies using the following descending order of precedence:

A. Addenda.

B. Proposal Package and Special Provisions.

C. Additional Project Information in Bid Package

D. Proposal Notes

E. Plans.

F. Supplemental Specifications.

G. Standard Construction Drawings.

H. Cuyahoga County Engineer General Provisions.

I. Standard Specifications (ODOT Itemized CMS).

Immediately notify the Engineer upon discovering any latent error or omission in the Contract Documents.

105.05 Cooperation by Contractor.

The Contractor will be supplied with two sets of plans and Contract Documents, one set of which the Contractor shall keep available on the Work at all times.

The Contractor shall give the Work the constant attention necessary to facilitate the progress thereof. He/she shall cooperate with the Engineer, his/her inspectors, and all other contractors of any agency in every way possible.

105.06 Superintendent.

The Contractor shall have on the Work at all times, as his/her agent, a competent superintendent capable of reading and thoroughly understanding the plans and specifications and thoroughly experienced in the type of

Work being performed, who shall receive instructions from the Engineer or his/her authorized representatives. The superintendent shall have full authority to execute orders or directions of the Engineer without delay, and to promptly supply such materials, equipment, tools, labor, and incidentals as may be required. Such superintendence shall be furnished irrespective of the amount of work sublet. The superintendent shall be in charge of all construction operations regardless of who performs the Work.

105.07 Cooperation with Utilities.

Unless otherwise provided for by the Contract Documents, the County will direct the utility owners to relocate or adjust water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction at no cost to the Contractor.

If the Contractor is directed by a utility company to perform any work not specifically contained in this note, the County will not compensate the Contractor for this work unless the County approves the request in writing before the work begins. If the work is not preapproved by the County, the Contractor will be responsible for obtaining reimbursement for its work from the utility company which directed the Contractor to perform the work.

In the event that the Contractor requests that additional work, not specifically contained in this note, be performed by a utility company, the Contractor will be responsible for reimbursing the utility company for the additional work unless the County has agreed in writing to pay for the additional work before the work begins.

The Contract Documents will indicate various utility items and indicate a time frame or date when the County expects the owners to complete utility relocation or adjustment. Provide utility owners adjusting facilities during construction with adequate notification of the scheduled Work to prevent conflict with the Contractor's schedule of operations.

When bidding, consider all permanent and temporary utility appurtenances in present and relocated positions as shown in the Contract Documents.

According to ORC 153.64 and at least 2 Workdays prior to commencing construction operations in an area that may affect underground utilities shown on the Plans, notify the Engineer, the registered utility protection service, and the owners that are not members of the registered utility protection service.

The owner of the underground utility shall, within 48 hours, excluding Saturdays, Sundays, and legal holidays, after notice is received, start staking, marking, or otherwise designating the location, course, ±2 feet (±0.6 m), together with the approximate depth of the underground utilities in the construction area.

If the utility owners fail to relocate or adjust utilities as provided for in the Contract Documents and the Contractor sustains losses that could not have been avoided by the judicious handling of forces, equipment, and plant, or by reasonable revisions to the schedule of operations, then the Engineer will adjust the Contract according to 108.06 and 109.05.

105.08 Cooperation Between Contractors.

Cuyahoga County reserves the right at any time to contract for and perform other or additional Work on or near the Work covered by the contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct his Work so as not to interfere with or hinder the progress or completion of the Work being performed by other contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his contract and shall protect and save harmless the Cuyahoga County and the Cuyahoga County Department of Public Works from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by him because of the presence and operations of other contractors working within the limits of the same project.

The Contractor shall arrange his Work and shall place and dispose of the materials being used so as not to interfere with the operations of the other contractors within the limits of the same project. He shall join his

Work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

105.09 Authority and Duties of Project Engineer or Supervisor and Inspector/Technician.

A. As the direct representative of the Cuyahoga County Department of Public Works, the project engineer or supervisor has immediate charge of the engineering details of his/her construction project. The project engineer or supervisor is responsible for the administration and satisfactory completion of the project. The project engineer or supervisor has the authority to reject defective material and to suspend any Work that is being improperly performed.

B. Inspectors/Technicians are authorized to inspect the Work and the preparation, fabrication, or manufacture of materials. Inspectors are not authorized to alter or waive requirements of the Contract Documents. Inspectors are authorized to notify the Contractor of Work that does not conform to the Contract; reject materials that do not conform to Specification requirements; and until the issue is decided by the Engineer, suspend portions of the Work if there is a question regarding the Contract Documents, use of unapproved material, or safety. Inspectors are not obligated or authorized to provide direction, superintendence, or guidance to the Contractor, its crew, its subcontractors, or suppliers to accomplish the Work.

   Any action or inaction of the Inspector/Technician does not constitute a waiver of the County's right to pursue any and all legal remedies for defective work or work performed by the Contractor in an un-workman like manner.

105.10 Inspection of Work.

All materials and each part or detail of the Work shall be subject to inspection by the Engineer. The Engineer or his/her representative shall be provided access to all parts of the Work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection. The Contractor shall notify the Engineer at least 24 hours prior to all required inspections.

If the Engineer requests it, the Contractor, at any time before acceptance of the Work, shall remove or uncover such portions of the finished Work as may be directed. After examination, the Contractor shall restore said portions of the Work to the standard required by the specifications. Should the Work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as Extra Work per 109.05; but should the Work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed, will be at the Contractor's expense.

The County shall have the discretion to dictate the level of inspection for any item of work. The Contractor bears sole responsibility for the quality of the work and compliance with the Contract regardless of the County's level of inspection.

Any Work done, or materials used without supervision or inspection by an authorized Cuyahoga County Department of Public Works representative may be ordered removed and replaced at the Contractor's expense. Failure to reject any defective Work or material shall not in any way prevent later rejection when such defects are discovered, or obligate Cuyahoga County to final acceptance.

When any unit of government or political subdivision or any railroad corporation is to pay a portion of the cost of the Work covered by this contract, its representatives shall have the right to inspect the Work. Such inspection shall in no sense make any unit of government or political subdivision or any railroad corporation a party to this contract and shall in no way interfere with the rights of either party hereunder.

105.11 Removal of Defective and Unauthorized Work.

Work that does not conform to the requirements of the Contract is defective.

Unless the County formally accepts defective Work according to 105.03, immediately remove and replace defective Work.

Unauthorized Work is Work done contrary to the instructions of the Engineer, beyond the plan lines, or any extra work done without the County's permission. The County will not pay for unauthorized Work. The Engineer may order the Contractor to remove or replace unauthorized Work at no expense to the County.

If the Contractor fails to comply with the Engineer's orders under the provisions of this subsection, the Engineer may correct or remove and replace defective or unauthorized Work and deduct the costs from the Contract Price.

105.12 Load Restrictions.

The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads. A special permit will not relieve the Contractor of liability for damage which may result from the moving of equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or the roadway or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. In no case shall legal load limits be exceeded unless permitted in writing by the local authority or authorities having jurisdiction and control of any road, street or bridge the Contractor proposes to use. The Contractor shall be responsible for all damage done by his/her equipment. Comply with Section 501.05.B.6.

105.13 Haul Roads.

Prior to using any roads or streets for hauling equipment or materials, the Contractor shall first notify the Engineer, in writing, as to the specific roads or streets he/she desires to use.

The contractor shall obtain written permission from the local authority having jurisdiction and control of any road or street he/she proposes to use as a haul road.

If, during the course of construction, it is determined by the Engineer that damages have occurred to haul roads or streets as a direct result of the proper use thereof for the hauling of equipment or materials, then the Engineer may order the Contractor to make immediate temporary repairs so as to assure reasonably normal conditions for the traveling public in so far as is practicable. Payment for such repairs shall be in accordance with the applicable provisions of 109.04 or 109.05.

The Contractor shall save the Cuyahoga County and the Cuyahoga County Department of Public Works harmless from any and all disputes between the Contractor and the local authorities regarding the use or continued use of said haul roads or streets, and from any claim for delaying the project or otherwise hindering the fulfillment of the contract on the part of the Contractor.

105.14 Maintenance During Construction.

The Contractor shall maintain the Work during construction and until the project is accepted according to 109.11 or 109.12. This maintenance shall constitute continuous and effective Work prosecuted day by day, with adequate equipment and forces to the end that the roadway or structures are kept in satisfactory condition at all times. The Contractor is responsible for damage done by its equipment.

Maintain the previous courses of subgrade during all construction operations, when placing a course upon other courses of embankment, base, subgrade, concrete or asphalt pavement, or other similar items previously constructed. This maintenance includes, but is not limited to draining, re-compacting, re-grading, or if destroyed, the removal of Work previously accepted by the County.

Maintain Post Construction Storm Water Best Management Practice (BMP) features. Prevent sediment laden surface water from coming in contact with the BMP features during construction.

All cost of maintenance Work during construction and before the project is accepted shall be included in the unit prices bid on the various pay items and the Contractor will not be paid an additional amount for such Work.

105.15 Failure to Maintain Roadway or Structure.

If the Contractor, at any time, fails to comply with the provisions of 105.14, the Engineer will immediately notify the Contractor of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 24 hours after receipt of such notice, the Engineer may immediately proceed to maintain the project, and the entire cost of this maintenance will be deducted from monies due or to become due the Contractor on his/her contract.

105.16 Borrow and Waste Areas.

The allowed use of Project Right-of-Way and other County property for borrow and waste is detailed in 104.03 and 107.11.

Whether materials are borrowed or wasted in borrow or waste areas or, if allowed by the Contract Documents, wasted on the Project site, comply with the requirements of this subsection:

Prior to beginning borrow or wasting operations, obtain the Engineer's written approval of a detailed operation plan that addresses the following concerns:

A. Control of drainage water.

B. Cleanup, shaping, and restoration of disturbed areas.

C. Disposal of regulated materials.

D. Avoidance of regulated areas.

E. Excavation and filling of waste and borrow areas.

F. Saving of topsoil.

G. Temporary Sediment and Erosion Control BMPs required for compliance under the Clean Water Act, Ohio Water Pollution Control Act, (OWPCA) (ORC Chapter 6111) and the NPDES permit.

Perform all engineering, including any field investigation, necessary to ensure long term stability of all side slopes and foundations of all borrow and waste areas. Furnish a certification by a Registered Engineer attesting to the stability of all borrow and waste areas. All damage resulting from the instability of borrow and waste areas, the removal of borrow materials, the placement of waste materials, or the hauling of material to and from these areas is the sole responsibility of the Contractor. Repairs to approved haul roads will be made in accordance with 105.13.

Ensure that all side slopes of all borrow and waste areas are beyond the clear zone for the highway as defined by the current version of ODOT's Location and Design Manual.

Ensure that all side slopes of all waste areas do not reduce horizontal sight distance as defined by the current version of ODOT's Location and Design Manual.

Have the proposed borrow and waste areas reviewed by an environmental consultant that is pre-qualified by ODOT for ecological work. Have the environmental consultant certify that the proposed borrow and waste operations will not impact the "Waters of the United States" or an isolated wetland. If consultant certification is not provided, obtain the 404/401 permits necessary to perform the operations as proposed. Have the environmental consultant certify that the work conforms to the requirements of the permit(s). Provide all documentation submitted to obtain the appropriate permit(s) and a copy of the permit(s) to the ODOT's Office of Environmental Services.

If burning is permitted under the OAC-3745-19 and ORC 1503.18, submit a copy of the Ohio EPA permit and the Ohio DNR permit to the Engineer and copies of all information used to obtain the permit.

All damage to surrounding property resulting from the instability of borrow and waste areas, the removal of borrow materials, the placement of waste materials, or the hauling of material to and from these areas is the sole responsibility of the Contractor.

Prior to the disposal of waste materials, submit to the County an executed copy of the Contract or permission statement from the property owner. The Contract or permission statement must indicate that the waste materials are not the property of the County. Further, it must expressly state that the County is not a party to the Contract or permission statement and that the Contractor and property owner will hold the County harmless from claims that may arise from their contract or permission statement.

Restoration of all borrow or waste areas includes cleanup, shaping, replacement of topsoil, and establishment of vegetative cover by seeding and mulching according to 104.04 and Item 659. Ensure the restored area is well drained unless approval is given by the Engineer to convert a pit area into a pond or lake, in which case confine restoration measures to the disturbed areas above the anticipated normal water level.

For waste sites shown on the plan, the plan will indicate if the clearances have or have not been obtained for the project right-of-way locations. No extension of time or additional compensation will be paid for any delays due to not having the written permit(s) to waste in a floodplain.

The allowed use of Project Right-of-Way and other County owned property for borrow or waste is detailed in 104.03 and 107.11.

Borrow and Waste Area shall adhere to 107.10.

The cost of Work described herein is incidental to the Contract, unless included under another item of Work.

105.17 Construction and Demolition Debris.

OAC-3745-37, OAC-3745-400, and ORC Chapter 3714 regulates the use and disposal of construction and demolition debris. Notify the local Board of Health or the local Ohio EPA office 7 days before placing clean hard fill off the Right-of-Way. Submit copies of this notification to the Engineer.

Legally dispose of debris containing wood, road metal, or plaster at a licensed construction and demolition debris site.

Under the regulations cited above the disposal of brush, trees, stumps, tree trimmings, branches, weeds, leaves, grass, shrubbery, yard trimmings, crop residue, and other plant matter is restricted. If allowed by the Contract Documents, the Contractor may waste brush, trees, stumps, tree trimming, branches, weeds, leaves, grass, shrubbery, yard trimmings, crop residue, and other plant matter within the Right-of-Way. Otherwise, submit a plan and any required permits to legally dispose of these materials off the Right-of-Way to the Engineer. Provide all documents submitted to obtain this permit to the Engineer.

If the Project contains garbage or solid and hazardous waste, the Contract Documents will detail the removal of these items.

Clean hard fill consisting of reinforced or non-reinforced concrete, asphalt concrete, brick, block, tile, or stone that is free of all steel as per 703.16 shall be managed in one or more of the following ways:

1. Recycled into a usable construction material.
2. Disposed in licensed construction and demolition debris facility.
3. Used in legitimate fill operations on the site of generation according to 105.16.
4. Used in legitimate fill operations on a site other than the site of generation to bring a site up to grade on an existing roadbed or parking lot project.

A Beneficial Reuse Certification form needs to be properly executed by the Recipient prior to any material leaving the project.

105.18 Acceptance.

The County will accept Work according to 109.091 and 109.12 or completed sections of the Project according to 109.11.

105.19 Value Engineering Change Proposals.

The County will Partner with the Contractor by considering the Contractor's submission of a Value Engineering Change Proposal (VECP) which will reduce construction costs and possibly time on projects that do not contain Design Build provisions or incentive provisions based on time. The purpose of this provision is to encourage the use of the ingenuity and expertise of the Contractor in arriving at alternate plans, specifications, or other requirements of the contract. Savings in construction costs and possibly time will be shared equally between the Contractor and the County. The Contractor's costs for development, design, and implementation of the VECP are not eligible for reimbursement. The VECP must not impair any of the essential functions and characteristics of the project such as service life, reliability, economy of operation, ease of maintenance, safety, and necessary standardized features. The submission of the VECP shall conform with ODOT Supplement 1113. Acceptance of a VECP is at the sole discretion of the County.

The County will not approve VECPs with any of the following characteristics:

A. Consist only of non-performing items of work contained in the plans.

B. Include plan errors identified by the Contractor as part of the cost reduction.

C. The VECP designer/consultant for the Contractor is also the designer of record for the County.

D. Changes of any special architectural or aesthetic treatments.

E. Changes the type or buildup of permanent pavement without approval of the maintaining agency (and ODOT if federal money is involved) or lessens the overall structural capacity of the permanent pavement.

F. Compromises controlling design criteria or would require a design exception as discussed in Volume I, Section 100, of the ODOT Location and Design Manual.

Engineering and drawing development and implementation costs for the VECP are not recoverable.

The Contractor shall have no claim against the County for any costs or delays due to the County's review or rejection of the initial VECP.

If the County already is considering revisions to the contract which are subsequently proposed as a VECP, the County may reject the Contractor's initial VECP or portions thereof and may proceed with such revisions without any obligations to the Contractor.

106 CONTROL OF MATERIAL

106.01 Source of Supply and Quality Requirements.

The materials used on the Work shall meet all requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of his/her proposed sources prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If it is found after trial that the sources of supply do not produce the specified materials, the Contractor shall furnish from other sources without adjustment to the contract price or completion date.

106.02 Samples, Tests, Cited Specifications.

All materials will be inspected and in compliance with the specified requirements determined by the Engineer before they are incorporated into the Work. Materials may be sampled and tested by the Engineer or certifications required as designated herein. Certifications or samples are required as directed for materials not covered herein. Unless otherwise designated, tests in accordance with AASHTO, ASTM or the methods on file in the office of the Cuyahoga County Department of Public Works will be made by and at the expense of the Cuyahoga County Department of Public Works. Samples will be taken in accordance with the Cuyahoga County Department of Public Works' procedures by a qualified representative of the Cuyahoga County Department of Public Works. References included in these specifications to AASHTO, ASTM, Federal Specifications and to other referenced specifications shall be the test method or specification as amended to its issue date next preceding the bid opening date. Materials being used are subject to inspection, test, or rejection at any time prior to incorporation into the Work. Copies of tests made by the Engineer will be furnished to the Contractor's representative upon request. The Contractor, in all cases, shall furnish the required samples and specified materials certifications at no expense to the County other than provided in 109.03.

Transports and distributors hauling bituminous material shall be equipped with an approved submerged bituminous material sampling device.

106.03 Small Quantities and Materials for Temporary Application.

The Engineer may accept small quantities and materials for temporary application that are not intended for permanent incorporation in the Work. The Engineer may accept these small quantities and materials for temporary application in either of the following cases:

A. Where similar materials from the same source have recently been approved.
B. Where the materials, in the judgment of the Engineer, will serve the intended purpose.

106.04 Plant Sampling and Testing Plan.

The Engineer may undertake the inspection of materials at the source. In the event plant sampling and testing is undertaken, the following conditions shall be met:

(a) The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he/she has contracted for materials.
(b) The Engineer shall have full entry at all times to such parts of the plant as may concern the manufacture or production of the materials being furnished. Agree to make available to the County, upon request, all documentation and inspection requirements of the ODOT TE-24 plant sampling and testing plan.
(c) If required by the Engineer, the Contractor shall arrange for an approved building for the use of the inspector; such building to be located conveniently near the plant, independent of any building used by the material producer.
(d) Adequate safety measures shall be provided and maintained.

It is understood that the Cuyahoga County Department of Public Works reserves the right to retest all materials prior to incorporation into the Work which have been tested and accepted at the source of supply after the same have been delivered and to reject all materials which, when retested, do not meet the requirements of these specifications, or those established for the specific project.

106.05 Storage of Materials.

Materials shall be so stored as to assure the preservation of their quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected prior to their use in the Work. Stored materials shall be located so as to facilitate their prompt inspection. Approved portions of the right-of-way may be used for storage purposes and for the placing of the Contractor's plant and equipment, but any additional space required therefore must be provided by the Contractor at his/her expense. Private property shall not be used for storage purposes without written permission of the owner or lessee, and if requested by the Engineer copies of such written permission shall be furnished to him/her. All storage sites shall be restored to their original condition by the Contractor at his/her expense. The Contractor and property owner will hold the County harmless from claims that may arise from their contract or permission statement. This shall not apply to the stripping and storing of topsoil, or to other materials salvaged from the Work.

Areas used to Store Materials shall conform to 107.10.

106.06 Handling Materials.

All materials shall be handled in such manner as to preserve their quality and fitness for the Work. Aggregates shall be transported from the storage site to the Work in tight vehicles so constructed as to prevent loss or segregation of materials after loading and measuring in order that there may be no inconsistencies in the quantities of materials intended for incorporation in the Work as loaded, and the quantities as actually received at the place of operations.

106.07 Unacceptable Materials.

All materials not conforming to the requirements of the specifications at the time they are used shall be considered unacceptable and shall be removed immediately from the site of the Work unless otherwise instructed by the Engineer. No materials, the defects of which have been corrected, shall be used until approval has been given. Upon failure on the part of the Contractor to comply immediately with any order of the Engineer made under the provisions of this section, the Engineer shall have authority to remove and replace defective materials and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor.

106.08 Material Furnished by the Cuyahoga County Department of Public Works.

The Contractor shall furnish all materials required to complete the Work, except when otherwise provided in the proposal. Material furnished by the Cuyahoga County Department of Public Works will be delivered or made available to the Contractor as provided for in the Cuyahoga County Engineer Specification Booklet or in the plans.

The cost of handling and placing all materials after they are delivered to the Contractor shall be considered as included in the contract price for the item in connection with which they are used.

The Contractor will be held responsible for all material delivered to him/her and deductions will be made from any monies due him/her to make good any shortages and deficiencies, from any cause whatsoever, and for any damage which may occur after such delivery, and for any demurrage charges.

106.09 Steel and Iron Products Made in the United States.

Furnish steel and iron products that are made in the United States according to the applicable provisions of Federal regulations stated in 23 CFR 635.410 and State of Ohio laws, and ORC 153.011 and 5525.21. “United States” means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

A. Federal Requirements. All steel or iron products incorporated permanently into the Work must be made of steel or iron produced in the United States and all subsequent manufacturing must be performed in the United

States. Manufacturing is any process that modifies the chemical content; physical shape or size; or final finish of a product. Manufacturing begins with the initial melting and mixing and continues through the bending and coating stages. If a domestic product is taken out of the United States for any process, it becomes a foreign source material.

B. State Requirements. All steel products used in the Work for load-bearing structural purposes must be made from steel produced in the United States. State requirements do not apply to iron.

C. Applications.

1. When the Work is Federally funded both the Federal and State requirements apply. This includes all portions of the Work, including portions that are not Federally funded.
2. When the Work has no Federal funds, only the State requirements apply.

D. Exceptions. When the work is Federally funded, ODOT may grant specific written permission to use foreign steel or iron products in bridge construction and foreign iron products in any type of construction. When the work is not Federally funded, the County may grant specific written permission to use foreign steel or iron products in bridge construction and foreign iron products in any type of construction. ODOT and/or the County may grant such exceptions under either of the following conditions:

1. The cost of products to be used does not exceed 0.1 percent of the total Contract cost, or $2,500, whichever is greater. The cost is the value of the product as delivered to the project.

2. The specified products are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet the requirements of the Contract Documents. ODOT and/or the County may require the Contractor to obtain letters from three different suppliers documenting the unavailability of a product from a domestic source if the shortage is not previously established.

E. Proof of Domestic Origin. Furnish documentation to the Engineer showing the domestic origin of all steel and iron products covered by this section before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

106.10 Qualified Product List.

The County may use Qualified Product Lists (QPL) for approval of manufactured materials. The Ohio Department of Transportation's (ODOT's) Office of Materials Management (OMM) will maintain the QPL and standard procedure for the QPL process. Inclusion of a material onto the QPL will be determined by OMM with support from other ODOT offices. To be kept on the QPL, manufacturers must recertify their material according to ODOT's standard procedure by January 1 of each year. When a material requires QPL acceptance, only provide materials listed on the QPL at the time of delivery of the material to the project. Provide the Engineer documentation according to ODOT's standard procedure that, at the time of delivery, the material provided is on the QPL.

106.11 Maritime Transportation.

On federal-aid projects, ensure that project-specific materials or equipment transported by ocean vessel are in compliance with 46 CFR 381 and the Cargo Preference Act. Transport at least 50% of any equipment or materials on privately owned United States-flag commercial vessels, if available.

107 LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

107.01 Laws to be Observed.

Stay fully informed of all Federal and State laws, all local laws, ordinances, and regulations, and all orders and decrees of authorities having any jurisdiction or authority that affect those engaged or employed on the Work, or that affect the conduct of the Work. Observe and comply with all such laws, ordinances, regulations, orders, and decrees. The Contractor shall protect and indemnify Cuyahoga County, the Cuyahoga County Department of Public Works and their representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees, subcontractors, or agents.

The Contractor, under Title VI of the Civil Rights Act and related statutes, agrees that in the hiring of employees for the performance of Work under this Contract or any subcontract hereunder, neither the Contractor, the subcontractor, nor any person acting on behalf of such Contractor or subcontractor shall, by reasons of race, religion, color, sex, national origin, disability or age, discriminate against any citizen of the United States in the employment of labor or workers, who is qualified and available to perform the Work to which the employment relates.

Neither the Contractor, the subcontractor, nor any person on their behalf shall, in any manner, discriminate against or intimidate any employee hired for the performance of Work under this Contract on account of race, religion, color, sex, national origin, disability or age.

Comply with OAC-4123:1-3, entitled "Specific Safety Requirements of the Industrial Commission of Ohio Relating to Construction," as amended, and with the Federal Occupational Safety and Health Act of 1970 and Code of Federal Regulations, Title 29, Chapter XVII, Part 1926 and as amended.

107.02 Permits, Licenses and Taxes.

The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work.

The Contractor shall not be required to pay any Manufacturer's Excise Tax or Ohio Sales Tax on materials to be incorporated into the Work. Cuyahoga County shall issue to the Contractor the Certificate of Exemption marked "State of Ohio-Political Subdivision #29". The Contractor shall pay all other taxes required by law. The lump sum and unit prices bid shall be exclusive of all exempt taxes and shall be so construed.

107.03 Patented Devices, Materials, and Processes.

If the Contractor employs any design, device, material, or process covered by letters of patent or copyright, he/she shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the Surety shall indemnify and save harmless Cuyahoga County, any affected third party or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material, process, or any trademark or copyright, and shall indemnify Cuyahoga County for any costs, expenses, and damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the Work.

In the case of patented pavements and wearing courses where royalties, licensing and proprietary service charges, exacted or to be exacted by the patentees, are published and certified agreements are filed with the Cuyahoga County Department of Public Works, guaranteeing to prospective bidders free unrestricted use of all such proprietary rights and trade-marked goods upon payment of such published charges, such patented pavements may be specifically designated in the proposal and competition secured upon the item exclusive of the patent or proprietary charges.

107.04 Restoration of Surfaces Opened by Permit.

The right to construct or reconstruct any utility service in the highway or street or to grant permits for same, at any time, is hereby expressly reserved by the Cuyahoga County Department of Public Works for the proper authorities of the municipality in which the Work is done and the Contractor shall not be entitled to any damages either for the digging up of the street or for any delay occasioned thereby.

Any individual, firm, or corporation wishing to make an opening in the highway must secure a permit. The Contract shall allow parties bearing such permits, and only those parties, to make openings in the highway. When ordered by the Engineer, the Contractor shall make in an acceptable manner all necessary repairs due to such openings and such necessary Work will be paid for as Extra Work, or as provided in these specifications, and will be subject to the same conditions as original Work performed.

107.05 Federal-Aid Provisions.

When the United States Government pays for all or any portion of the Project's cost, the Work is subject to the inspection of the appropriate Federal agency.

Such inspections will not make the Federal Government a party to this Contract. The inspections will in no way interfere with the rights of either party to the Contract.

107.06 Sanitary Provisions.

The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his/her employees and Cuyahoga County Department of Public Works representatives as may be necessary to comply with the requirements of the State and local Boards of Health, or of other authorities having jurisdiction.

107.07 Public Convenience and Safety.

The Contractor shall at all times so conduct his/her Work as to assure the least possible obstruction to traffic. The safety and convenience of the general public and the residents along the highway and the protection of persons and property shall be provided for by the Contractor. The attention of the bidder is directed to the provisions of 5543.17, ORC. Do not close any highways or streets unless specifically allowed by the contract.

The Contractor shall provide and maintain safeguards, safety devices and protective equipment and take any other needed actions as may be necessary to protect the public and property in connection with the Work. The presence of barricades, lights, or other traffic control devices, provided and maintained by any party other than the Contractor, shall not relieve the Contractor of this responsibility.

107.08 Bridges over Navigable Waters.

All Work on navigable waters shall be so conducted that free navigation of the waterways will not be interfered with and that the existing navigable depths will not be impaired except as allowed by permit issued by the U.S. Coast Guard. Work within the flood plain of a navigable stream may require the contractor to acquire a permit from the U.S. Army Corps of Engineers. If a U.S. Army Corps of Engineers permit is required, provide all documentation submitted to obtain the permit(s) and a copy of the permit(s) to the Engineer.

107.09 Use of Explosives.

When the use of explosives is necessary for the prosecution of the Work, exercise the utmost care not to endanger life or property, including new Work. The Contractor is responsible for all damage resulting from the use of explosives.

Obtain written permission to perform in-stream blasting from the Chief of the Division of Wildlife, Ohio DNR according to ORC 1533.58. Provide the Engineer with all documentation submitted to obtain this permit and with a copy of the permit.

The Contractor agrees, warrants, and certifies that it will observe State laws and local ordinances and regulations relative to the use and storing of explosives kept on the Project site.

Perform all blasting operations according to Item 208.

107.10 Protection and Restoration of Property.

The Contractor is responsible for the preservation of all public and private property impacted by the Contractor's operations.

The Contractor is responsible for all damage or injury to property, during the prosecution of the Work, resulting from any act, omission, neglect, defective work or materials, or misconduct in the manner or method of executing the Work. The Contractor will remain responsible for all damage and injury to property until the Project is accepted under 109.12, except for portions of the Work accepted under 109.11.

If the Contractor causes any direct or indirect damage or injury to public or private property by any act, omission, neglect, or misconduct in the execution or the non-execution of the Work, then it must restore, at its own expense, the property to a condition similar or equal to that existing before the damage or injury.

If mail boxes, road, or street name signs and supports interfere with the Work, then remove and erect them in a temporary location during construction in a manner satisfactory to and as directed by the Engineer. After completion of the Work and before final acceptance of the Project, erect the mailboxes, road, or street name signs and supports in their permanent locations according to the plans unless otherwise directed by the Engineer. Consider the cost of this Work as incidental to the affected items.

Cooperate with the Engineer in protecting and preserving monuments that are affected by the Work as required by ORC 5519.05. At the beginning of the Work, verify the position of all monuments in the area to be improved, according to 623. If monuments not shown in the Contract Documents are unexpectedly encountered, then protect, reference, and preserve them in the same manner as monuments that are shown in the Contract Documents.

Do not create staging areas, store materials and equipment, or borrow or waste materials in areas labeled as an environmental resources areas in the Contract Documents. All properties to be utilized by the Contractor outside of the Project Work Limits must be cleared for all environmental resource impacts prior to the beginning of work. Environmental resources include but may not be limited to:

1. Cultural Resources
    a. Buildings, structures, objects, and sites eligible for or listed on the National Register of Historic Places
    b. Historic or prehistoric human remains, cemeteries, and/or burial sites (pursuant with ORC 2909.05 and 2927.11)
2. Ecological Resources
    a. Wetlands
    b. Streams
    c. Wooded areas with trees to be removed in excess of 8 inches diameter at breast height
3. Public Lands
    a. Lands meeting the criteria of 49 U.S.C. 303, 23 CFR 771.I35: 4(f).
    b. Lands meeting the criteria of 16 U.S.C. 4601-4, 36 CFR59.1: 6(f).
4. FEMA Mapped 100-year Floodplains
5. Hazardous Waste Areas

Except for locations utilized specifically for;

1. parking of equipment between workdays for maintenance type projects;
2. disposal or stockpile locations that currently hold a Federal, ODNR or OEPA sanctioned permit that specifically allows the disposal or stockpiling activity. This exception requires the contractor to provide the Engineer with the permitted facility's name, location, site ID number and the permit holder's certification that disposal or stockpiling the project generated material is compliant with the recipient's permit.

All areas proposed to be utilized by the Contractor outside the project construction limits and not described above shall be reviewed by environmental contractor(s) that are prequalified by ODOT for each environmental resource. This exception applies to projects with "maintenance" in the project description. Have the consultant(s) certify that the proposed site to be utilized for the contractor will not impact:

1. Cultural Resources
2. Ecological Resources
3. Public Lands
4. FEMA Mapped 100-year Floodplains
5. Hazardous Waste Areas

Provide all documentation and the consultant certification to the ODOT Office of Environmental Services with a copy to the Engineer.

Should the areas proposed for use by the Contractor outside of the Project Work Limits contain environmental resources the Contractor is responsible to the County for all environmental clearances and permits prior to the beginning of work.

107.11 Contractor's Use of the Project Right-of-Way or Other County-Owned Property.

A. Disposal of Waste Material and Construction Debris and Excavation of Borrow on the Project Right-of-Way or on Other County-Owned Property.

Dispose of waste material according to 105.16 and dispose of construction debris according to 105.17. In addition to the rights granted in 104.03, the Contractor's use of the Project Right-of-Way or other County-owned property for the disposal of waste material and construction debris and excavation of borrow material is restricted as follows:

1. If the Contract Documents identify locations for the disposal of waste material and construction debris or excavation of borrow material within the Project Right-of-Way or on other County-owned property, then only perform these operations in these designated locations.
2. If the Contract Documents do not identify locations for the disposal of waste material and construction debris or excavation of borrow material within the Project Right-of-Way or on other County-owned property, then do not bid assuming that the County will make such locations available.

If the Contractor's request to use locations within the Project Right-of-Way or on other County-owned property is approved by the Engineer, then the County may allow the Contractor to dispose of waste material and construction debris or excavate borrow material for a fee of $0.50 per cubic yard.

B. Contractor's Use of Portable Plants Within the Project Right-of-Way or on Other County-Owned Property.

The Contractor's use of portable plants within the Project Right-of-Way or on other County-owned property is limited as follows:

1. If the Contract Documents identify locations within the Project Right-of-Way or on other County-owned property to place a portable plant, then only place a portable plant in these designated locations subject to the requirements of 107.11.C.
2. If the Contract Documents do not identify locations within the Project Right-of-Way or on other County-owned property to place a portable plant, then do not bid assuming that the County will make such locations available.

However, the County will consider a Value Engineering Change Proposal (VECP) for the placement of a portable plant within the Project Right-of-Way or on other County-owned property and, if accepted, may allow the use of a particular site on its property subject to the requirements of 107.11.C.

C. Placement of a Portable Plant within the Project Right-of-Way or on Other County-Owned Property.

To place a portable plant within the Project Right-of-Way or on other County-owned property, comply with the following requirements:

1. Local noise ordinances.
2. Obtain any necessary EPA permits for the operation of the plant. Provide the County with a copy of the information submitted to obtain the permit and a copy of the permit.
3. Provide the Engineer written certification that the plant will supply material only for the Project for which it was approved. Do not use the plant to supply any other project or to sell materials commercially.
4. Submit a traffic control plan to the Engineer for approval that details the anticipated truck movements and provides acceptable protection, warning, and guidance to motorists, pedestrians, and the workers.

D. Equipment Storage and Staging.

The Contractor may use, fee-free, any portion of the Project within the Project Right-of-Way for staging, equipment storage, or an office site with the approval of the Engineer, provided such usages do not interfere with the Work and are not prohibited by the Contract Documents. Do not bid in anticipation of using any properties within the Project Right-of-Way or County-owned property outside the Project Right-of-Way for equipment storage or staging. For all other private property, provide evidence of an agreement with the property owner granting/indicating permission to use said property.

E. Equipment Removal and Site Restoration.

Remove all Contractor equipment and completely restore all utilized sites used as required by 104.04 before Final Acceptance as provided in 109.12.

107.12 Responsibility for Damage Claims and Liability Insurance.

The Contractor shall indemnify and save harmless County of Cuyahoga, Ohio and its employees, the State of Ohio, municipalities, public utilities, any affected railroad or railway company, and any fee owner from whom a temporary Right-of-Way was acquired for the Project from all suits, actions, claims, damages, or costs of any character brought on account of any injuries or damages sustained by any person or property on account of any negligent act or omission by the Contractor or its subcontractors or agents in the prosecution or safeguarding of the Work.

The Contractor shall procure and maintain insurance for liability for damages imposed by law and assumed under this Contract, of the kinds and in the amounts hereinafter provided from insurance companies authorized to do business in the State by the Ohio Department of Insurance. The cost of insurance is incidental to all contract items. Before the execution of the Contract by Cuyahoga County, furnish to Cuyahoga County, a certificate or certificates of insurance in the form satisfactory to Cuyahoga County demonstrating compliance with this subsection. Provide an insurance certificate or certificates that show that the Contractor's liability and auto policies coverage are not reduced, restricted, or canceled until 30 days written notice has been given to Cuyahoga County by the insurer. Mail all certificates and notices to the address listed in the Section 1 Legal Notice to Bidders (see Proposal Package). Upon request, the Contractor shall furnish Cuyahoga County with a certified copy of each policy, including the provisions establishing premiums.

The Contractor shall procure, maintain, and pay premiums for the insurance coverage and limits of liability outlined below with respect to products, services, work and/or operations performed in connection with this Contract:

1. **Mandatory Insurance Requirements**
   The following three items (Worker's Compensation Insurance, Commercial General Liability Insurance, and Business Automobile Liability Insurance) are all mandatory requirements. The Contractor shall procure, maintain, and pay premiums for the following forms of insurance:

(a) **Worker's Compensation Insurance** as required by the State of Ohio. Such insurance requirement may be met by either purchasing coverage from the Ohio State Insurance Fund or by maintaining Qualified Self-Insurer status as granted by the Ohio Bureau of Workers Compensation (BWC).

Comply with all provisions of the laws and rules of the Ohio Bureau of Workers' Compensation covering all operations under Contract with the County whether performed by it or its subcontractors. In addition, if a portion of the Work is performed from a barge or ship or requires unloading material from a barge or ship on a navigable waterway of the United States, it is the responsibility of the Contractor to arrange coverage for that portion of the Work under the Longshore and Harborworkers' Compensation Act [33 USC Section 901 *et seq.*] and the Jones Act [5 USC Section 751 *et seq.*] and provide proof of coverage to the County.

For Contractors with employees working outside of Ohio, Worker's Compensation Insurance as required by the various state and Federal laws as applicable including Employers' Liability coverage with limits of liability not less than:

$1,000,000 each accident for bodily injury by accident;
$1,000,000 each employee for bodily injury by disease;
$1,000,000 policy limit for bodily injury by disease.

Such insurance shall be written on the National Council on Compensation Insurance (NCCI) form or its equivalent.

(b) **Commercial General Liability Insurance** with limits of liability not less than:

$1,000,000 each occurrence bodily injury & property damage;
$1,000,000 personal & advertising injury;
$2,000,000 general aggregate;
$2,000,000 products/completed operations aggregate.

Obtain the above minimum coverages through primary insurance or any combination of primary and umbrella insurance. In addition, the County will require the General Aggregate Limit on a per project basis.

Such insurance shall be written on an occurrence basis on the Insurance Services Office (ISO) form or its equivalent.

i. Coverage under this policy shall include Explosion, Collapse, and Underground (XCU) coverage at the same limits of Commercial General Liability.
ii. Whenever work under this project is to be done by blasting, coverage under the policy shall also include XCU coverage with Each Occurrence Limit of $1,000,000 and a minimum Aggregate Limit of $5,000,000.
iii. Whenever work under this project is to be done in the vicinity of existing underground utilities or structures, coverage under the policy shall also include all damages to said underground utilities or structures during construction at the same limits of Commercial General Liability.
iv. The Contractor agrees to carry coverage similar in nature to any of the applicable and requisite coverages itemized in Sections i-iii above, for a period of 2 (two) years after completion of the Project.

Ensure that the Commercial General Liability Insurance policy names County of Cuyahoga, Ohio, and its employees as additional insureds with all rights to due notices in the manner set out above. Submit proof of insurance, endorsements, and attachments to the Engineer prior to starting the Work.

(c) **Business Automobile Liability Insurance** covering all owned, non-owned, hired, and leased vehicles. Such insurance shall provide a limit of not less than $1,000,000 combined single limit (bodily injury & property damage) each accident;

Such insurance shall be written on an occurrence basis on the Insurance Services Office (ISO) form or its equivalent.

2. **Additional Insurance Coverage**
See Section 200 Special Provisions for any additional insurance coverage(s) that is (are) required "in addition to" the mandatory County insurance requirements set forth above.

Requirements for All Insurance Coverage

1. The insurance policies of the Contractor required for this Contract, shall:
   (i) Name the "County of Cuyahoga, Ohio and its employees" as an Additional Insured. This does not apply to Workers Compensation, All Risk Equipment Insurance, and Professional Liability/Errors & Omissions Insurance. Cuyahoga County, Ohio and its employees shall be named as Additional Insured and/or loss payee to the extent of the full amount of coverages as stated in all existing policies issued to the Contractor as of the effective date of this contract and at least in the amounts and coverages indicated above.
   (ii) Contain a waiver of subrogation provision wherein the insurer(s) waives all rights of recovery against the County.
   (iii) Be primary and not in excess or contingent on any other basis;
   (iv) The Certificates of Insurance evidencing these coverages shall contain the following additional insured and waiver of subrogation language where applicable:

   (A) "Cuyahoga County and its employees are additional insureds for purposes of commercial general liability and automobile liability"; and/or
   (B) "Waiver of subrogation in favor of the County."

2. The insurance required for this Contract shall be provided by insurance carrier(s) licensed to transact business and write insurance in the state(s) where operations are performed and shall carry a minimum A.M. Best's rating of A-VII or above.

3. The terms of this Contract shall be controlling and shall not be limited by any insurance policy provision.

4. These insurance provisions shall not affect or limit the liability of the Contractor stated elsewhere in this Contract or as provided by law.

5. The Contractor shall require any and all of its subcontractors to procure, maintain, and pay premiums for the insurance coverages and limits of liability outlined above with respect to products, services, work and/or operations performed in connection with this Contract.

6. The County reserves the right to require insurance coverages in various amounts or to modify or waive insurance requirements on a case-by-case basis whenever it is determined to be in the best interest of the County.

7. If the Bid/Proposal/RFQ specifies the need for higher limits of liability for any applicable insurance provision, the Bid/Proposal/RFQ specifications shall govern.

8. Where coverages are made on a claims-made basis the claims-made retroactive date on the policy shall be prior to the commencement of professional activity related to this Contract.

9. The Contractor shall furnish a Worker's Compensation Certificate and Certificate of Insurance evidencing the insurance coverages required herein are in full force and effect. Certificates are to be mailed to: Cuyahoga County Department of Purchasing, 2079 East 9th Street, 2nd Floor, Cleveland, Ohio 44115, as the Certificate Holder. Acceptance of a non-conforming certificate of insurance by the County shall not constitute a waiver of any rights of the parties under this Contract.

10. If the Contractor provides evidence of insurance in the form of certificates, valid for a period of time less than the period during which the Contractor is required to perform by the terms of the subject contract/project, the Contractor is obligated to renew its insurance policies as necessary and provide up to date certificates so that the County is continuously in possession of evidence that the Contractor's insurance is in accordance with the foregoing provisions.

11. If the Contractor fails or refuses to renew its insurance policies or the policies are canceled or terminated, or if the aggregate limits have been impaired by claims so that the amount available is under the minimum aggregate required, or modified so that the insurance does not meet the above requirements, the County may refuse to make payment of monies due and coming under any active contract between the County and the Contractor.

12. Insurance coverage in the minimum amounts set forth above will neither relieve the Contractor from liability in excess of such coverage, nor preclude the County from taking such other actions as are available to it under any other provisions of this Contractor or otherwise in law.

Clearly set forth all exclusions and deductible clauses in all proof of insurance submitted to Cuyahoga County. The Contractor is responsible for the deductible limit of the policy and all exclusions consistent with the risks it assumes under this Contract and as imposed by law.

If the Contractor provides evidence of insurance in the form of certificates of insurance, valid for a period of time less than the period during which the Contractor is required by terms of this Contract, then Cuyahoga County will accept the certificates, but the Contractor is obligated to renew its insurance policies as necessary. Provide new certificates of insurance from time to time, so that Cuyahoga County is continuously in possession of evidence that the Contractor's insurance is according to the foregoing provisions.

If the Contractor fails or refuses to renew its insurance policies or the policies are canceled or terminated, or if aggregate limits have been impaired by claims so that the amount available is under the minimum aggregate required, or modified so that the insurance does not meet the requirements of 107.12.C, Cuyahoga County may refuse to make payment of any further monies due under this Contract or refuse to make payment of monies due or coming due under other contracts between the Contractor and Cuyahoga County. Cuyahoga County in its sole discretion may use monies retained pursuant to this subsection to renew or increase the Contractor's insurance as necessary for the periods and amounts referred to above. Alternatively, should the Contractor fail to comply with these requirements, Cuyahoga County may default the Contractor and call upon the Contractor's Surety to remedy any deficiencies. During any period when the required insurance is not in effect, the Engineer may suspend performance of the Contract. If the Contract is so suspended, the Contractor is not entitled to additional compensation or an extension of time on account thereof.

Nothing in the Contract Documents and insurance requirements is intended to create in the public or any member thereof a third-party beneficiary hereunder, nor is any term and condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

107.13 Reporting, Investigating and Resolving Motorist Damage Claims.

Pursuant to 107.10 and 107.12, the following procedures shall be utilized by the Contractor and the Cuyahoga County Department of Public Works for reporting, investigating, and resolving motorist damage claims.

When a motorist reports damage to its vehicle either verbally or in writing to the Contractor, the Contractor shall within 3 days make and file a written report to the Engineer. In the event that the Engineer directly receives the motorist's claim, the Engineer shall within 3 days send the claim report to the Contractor. In the event the contractor has not agreed to resolve the motorist claim, the Engineer or his/her designated representative, as a co-insured party, may then contact the Contractor's insurance company and request that the insurance company investigate and resolve the claim. If the Contractor or their insurance company does not resolve the claim in a timely manner, the Engineer may advise the motorist of the option of pursuing the claim in the appropriate Court of Law.

In the event of a lawsuit filed by the motorist in the appropriate Court of Law against Cuyahoga County and/or the Cuyahoga County Department of Public Works, Cuyahoga County and/or the Cuyahoga County Department of Public Works, as co-insured party, may request the Contractor's insurance company to defend this lawsuit and hold Cuyahoga County and/or the Cuyahoga County Department of Public Works harmless in accordance with 107.12.

If the lawsuit claim amount is $2,500 or less and the Court of Claims Coordinator determines that the Contractor is responsible for the claimed damages then the County's Court of Claims Coordinator may, after notifying the Contractor, determine that it would be in the best interest of the County to settle the claim. Any settlement amount including court costs may be assessed to the Contractor and deducted from the project. The Engineer will notify the Contractor prior to executing the deduction. The Contractor or the Contractor's insurance company may within 14 days appeal the assessment decision of the Court of Claims Coordinator to the Engineer. The decision of the Engineer will be made within 14 days and will be administratively final.

107.14 Opening Sections of Project to Traffic.

The Engineer may order the Contractor to open a section of the Work to the safe use of traffic at any time. The County will make an adjustment according 108.06 and 109.05 to compensate the Contractor for the added costs and delay, if any, resulting from such an opening.

107.15 Contractor's Responsibility for Work.

Until final written acceptance of the project by Cuyahoga County, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the Work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the Work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to weather, civil disturbances, or governmental acts.

In the event that damage to completed permanent items of Work results from traffic utilizing a substantially completed section of roadway, as determined by the Engineer, the Contractor may be compensated for repair of damage as authorized by Subsidiary Agreement to establish the propriety of reimbursement. To receive compensation for damage the Contractor must meet the following requirements:

1. The Contractor must formally notify the Engineer of each occurrence of damage within 10 calendar days.

2. The Contractor shall contact the local law enforcement agency to determine if the damage (accident) was investigated and a report filed. If an accident report was filed, the Contractor shall obtain the report and notify the motorist, and copy their insurance company, via registered mail that the motorist is responsible

for the cost of damage repairs. If the motorist does not respond within 30 days, the Contractor shall make a second attempt to contact the motorist and copy the insurance company via registered mail.

3. If no response is received from the motorist or insurance company within 30 days, the Contractor will send a letter to the Engineer and include documentation of good faith effort to seek recovery from responsible parties.

4. Cuyahoga County will compensate the Contractor to make necessary repairs to the damaged Work and request the Cuyahoga County Prosecutor to collect the costs from responsible parties on behalf of Cuyahoga County.

If there is no accident report on file and no means of identifying the guilty motorist, the Contractor will likewise be compensated to repair the damaged Work.

In case of suspension of Work by the Contractor or under the provisions of 105.01 or 105.09 A, the Contractor shall be responsible for the project and shall take such precautions as may be necessary to prevent damage to the project, provide for normal drainage and shall erect any necessary temporary structures, signs, or other facilities at his/her expense. During such period of suspension of Work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established plantings, seeding, and sodding furnished under his/her contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

The Engineer may direct the Contractor to remove graffiti any time during the Work. The County will make an adjustment according to 108.06 and 109.05 to compensate the Contractor for the added costs and delays, if any, resulting from all ordered graffiti removal.

107.16 Contractor's Responsibility for Utility Property and Services.

At points where the Contractor's operations are adjacent to properties of railway, cable, telegraph, telephone, and power companies, or are adjacent to other property, damage to which might result in considerable expense, loss, or inconvenience, Work shall not be commenced until all arrangements necessary for the protection thereof have been made.

The Contractor shall cooperate with the owners of any underground or overhead utility lines in their removal and rearrangement operations in order to ensure that these operations progress in a reasonable manner, that duplication of rearrangement Work may be reduced to a minimum, and that services rendered by those parties will not be unnecessarily interrupted.

In the event of interruption to underground or overhead utility services as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall immediately contact emergency personnel, if required, and alert the occupants of nearby premises as to any emergency that the Contractor may create or discover at or near such premises. The Contractor shall then notify the Engineer and the owner or operator of the utility facility of the disruption and shall cooperate with the said utility owner or operator in the restoration of service. If water service is interrupted, repair Work shall be continuous until the service is restored. No Work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority. The Contractor shall not begin Work around fire hydrants until the local fire authority approves the Contractor’s provisions for continued service.

107.17 Furnishing Right-of-Way.

The Cuyahoga County Department of Public Works, through Cuyahoga County, will be responsible for the securing of all necessary rights-of-way in advance of construction. Any exceptions will be indicated in the proposal by reference to a specific parcel number. Prospective bidders will be notified in writing prior to the date scheduled for receipt of bids regarding the specific dates such parcels will be made available to the Contractor.

107.18 No Waiver of Legal Rights.

The following County actions do not waive the County's rights or powers under the Contract, or any right to damages herein provided:

A. Inspection by the Engineer or by any of Engineer's duly authorized representatives.
B. Any order, measurements, or certificate by the Engineer, or County representatives.
C. Any order by the Engineer or County representatives for the payments of money or the withholding of money.
D. Acceptance of any Work.
E. Any extension of time.
F. Any possession taken by the County or its duly authorized representatives.

The County will not consider any waiver of a breach of this Contract to be a waiver of any other subsequent breach.

107.19 Environmental Protection.

Comply with all Federal, State, and local laws and regulations controlling pollution of the environment. Avoid polluting streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, sediments, or other harmful materials, and avoid polluting the atmosphere with particulate and gaseous matter.

By execution of this contract, the Contractor, will be deemed to have stipulated as follows:

A. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

B. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

C. That the firm shall promptly notify the County of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

D. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

Fording of streams is prohibited. Causeways for stream and river crossings or for Work below a bridge are permitted provided:

A. The causeway complies with the requirements of the 404 Permit the County obtained for the Project.

B. The Contractor obtains a 404 Permit from the U.S. Army Corps of Engineers if the County has not obtained such a permit. Obtain the 404 Permit prior to beginning construction of the causeway. The County does not guarantee that the Contractor will be able to obtain a 404 Permit.

Comply with all current provisions of the Ohio Water Pollution Control Act, (OWPCA), (ORC Chapter 6111). The County will obtain a storm water permit under the OWPCA provisions when the plan Work acreage requires a permit. Apply for a permit to cover operations outside the Project limits shown on the plans as

required by the OWPCA provisions. When the County has not applied for a permit on the Project and a permit is required under the provisions of the OWPCA because of the total area of the Contractor's Work, apply for, obtain, and comply with the required permit for both the Work within Project limits and the Contractor's Work.

The County has obtained the required permits from the U.S. Army Corps of Engineers and Ohio EPA for Work in the "Waters of the United States" and isolated wetlands under ORC Chapter 6111. Comply with the requirements of these permits.

When equipment is working next to a stream, lake, pond, or reservoir, appropriate spill response equipment is required. Do not stockpile fine material next to a stream, lake, pond, or reservoir.

Take precautions to avoid demolition debris and discharges associated with the excavation and hauling of material from entering the stream. Remove any material that does fall into the stream as soon as possible.

When excavating in or adjacent to streams, separate such areas from the main stream by a dike or barrier to keep sediment from entering the stream. Take care during the construction and removal of such barriers to minimize sediment entering the stream.

Contain, collect, characterize, and legally dispose of all wastewater and sludge generated during the work. Do not mix waste water with storm water. Do not discharge any waste water without the appropriate regulatory permits. Manage wastewater and sludge in accordance with ORC Chapter 6111 and all other laws, regulations, permits, and local ordinances relating to this waste. Waste water management in incidental to the Work unless otherwise specified in the contract.

Control the fugitive dust generated by the Work according to OAC-3745-17-07(B), OAC-3745-17-08, OAC-3745-15-07, and OAC-3745-17-03 and local ordinances and regulations. Prior to the initiation of abrasive coating removal, pavement cutting or any other construction operation that generates dust, demonstrate to the Engineer that construction related dust will be controlled with appropriate Reasonable Available Control Measures (RACM) as described in OEPA Engineering Guide #57 (http://epa.ohio.gov/dapc/engineer/eguides.aspx).

In addition, use dust control measures when fugitive dust creates unsafe conditions as determined by the Engineer. Perform this work without additional compensation except for Item 616.

Perform open burning according to 105.16.

107.20 Civil Rights.

Comply with Federal, State, and local laws, rules, and regulations that prohibit unlawful employment practices including that of discrimination because of race, religion, color, sex, national origin, disability, or age and that define actions required for Affirmative Action and Disadvantaged Business Enterprise (DBE) programs.

For projects not involving Federal Funds, replace the term "Disadvantaged Business Enterprise (DBE)" with "Small Business Enterprise (SBE)".

107.21 Prompt Payment.

In accordance with ORC 4113.61, make payment to each subcontractor and supplier within 10 Calendar Days after receipt of payment from the County for Work performed or materials delivered or incorporated into the Project, provided that the pay estimate prepared by the Engineer includes Work performed or materials delivered or incorporated into the public improvement by the subcontractor or supplier. Contractors are prohibited from holding retainage from bonded subcontractors. For unbonded subcontractors, promptly release any retainage held, as set forth in any subcontractor or supplier agreement, within 10 days of County's acceptance of the work involving the subcontractor or supplier from whom retainage has been held. For the sole purpose of establishing a time frame for the release of the subcontractor or supplier retainage, acceptance of subcontractor or supplier work will occur when the subcontractor or supplier has complied with the

requirements of 109.12.A and B. No subcontract provision shall permit the Contractor to delay subcontractor's retainage payments until the Project's final payment.

The Contractor shall also require that this contractual obligation be placed in all subcontractor and supplier contracts that it enters into and further require that all subcontractor and suppliers place the same payment obligation in each of their lower tier contracts. If the Contractor, subcontractors, or supplier subject to this provision fail to comply with the 10 Calendar Day requirement, the offending party shall pay, in addition to the payment due, interest in the amount of 18 percent per annum of the payment due, beginning on the eleventh Calendar Day following the receipt of payment from the County and ending on the date of full payment of the payment due plus interest.

Repeated failures to pay subcontractors and suppliers timely pursuant to this subsection will result in a finding by the County that the Contractor is in breach of Contract and subject to all legal consequences that such a finding entails.

107.22 Personal Liability of Public Officials.

In carrying out any of the provisions of these specifications, or in exercising any power or authority granted to them by or within the scope of the contract, there shall be no liability upon County of Cuyahoga, Ohio, and its employees, either personally or as officials of the County, it being understood that in all such matters they act solely as agents and representatives of the County.

107.23 Unmanned Aircraft Systems.

If the project requires or anticipates the use of Unmanned Aircraft Systems within Cuyahoga County and/or ODOT Right of Way, the Contractor will follow proper risk assessment and federal regulations in accordance with ODOT Supplemental Specification 1132.

108 PROSECUTION AND PROGRESS

108.01 Subletting of Contract.

The provisions of this section apply to all subcontracts.

The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or contracts or any portion thereof, or of his/her right, title, or interest therein, without written approval of the Cuyahoga County Department of Public Works. Such approval shall not relieve the contractor of the responsibility for the management and performance of the sublet Work. A copy of any such subcontracts must be furnished to the Cuyahoga County Department of Public Works. In case such approval is given, the Contractor will be permitted to sublet a portion thereof, but shall perform with his/her own organization, Work amounting to not less than 50 percent of the total contract cost, except as set forth in paragraph (3) hereof. The term "his/her own organization" shall be construed to include only workers employed and paid directly by the Contractor and equipment owned or rented by him with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime Contractor. An assignment of contract Work is considered synonymous with a subcontract to perform Work.

To determine whether the Contractor is in compliance with the requirement that he/she perform with his/her own organization contract Work amounting to not less than 50 percent of the total contract price, the following criteria shall apply:

1. The contract amount upon which the 50 percent requirement is computed shall include the cost of materials and manufactured products which are to be purchased or produced under the contract provisions.

2. The percentage of subcontracted Work, for purposes of this section, shall always be based on original contract prices rather than actual subcontract prices. If only a part of a contract item is to be sublet, its proportional value shall be determined administratively on the same basis. This procedure shall be followed even when the part not sublet consists only of procuring the materials. However, when a firm both sells materials to a Contractor and performs the Work of incorporating the materials in the project, these two phases must be considered in combination and as constituting a single subcontract. If an affiliate of the firm either sells the materials or performs the Work, the Cuyahoga County Department of Public Works may refuse approval. An affiliate is one who has some common ownership or other close relation to said firm.

3. The Cuyahoga County Department of Public Works may reduce the 50 percent amount by insertion of a contract provision in the Special Provisions of the Cuyahoga County Engineer Specification Booklet. However, in no event shall the Contractor perform less than 35 percent of the total contract cost. No subcontract, or transfer of contract, shall release the Contractor of his/her liability under the contract and bonds, unless release is granted by Cuyahoga County.

In order to obtain the written approval of the Cuyahoga County Department of Public Works to sublet Work, the contractor must complete and submit to the Cuyahoga County Department of Public Works a Cuyahoga County Engineer form C-92C Request to Sublet for each proposed subcontractor.

The contractor must sublet all Work for which he/she does not hold the required ODOT work type qualification to subcontractors who hold the required ODOT work type qualifications. Upon approval of the Engineer, the contractor may employ subcontractors who do not hold an ODOT Certificate of Qualification to perform the following types of Work:

1. Work for which there is no corresponding work type.

2. Work for which the contractor holds the required ODOT work type qualification provided that the subcontractors' collective compensation does not exceed 15%, not to exceed $500,000.00, of the contract amount.

The County strongly encourages its contractors to pay its subcontractors swiftly and as soon as possible. Contractor shall pay its subcontractors who perform work on this project within ten (10) days of receiving payment for such work from the County. If the Contractor does not pay any of its subcontractors within ten (10) days of receiving payment from the County, then such failure shall be deemed a material default under this Agreement and the County shall receive a $1,000 credit off the next invoice from the Contractor.

108.02 Partnering.

It is the intent of the County to partner every project. The purpose of Partnering is to develop a proactive effort and spirit of trust, respect, and cooperation among all stakeholders in a project. Partnering does not affect the terms and conditions of the Contract. The Partnering process in this section is Self-facilitated Partnering performed by the Project personnel. Costs associated with the Self-facilitated Partnering process are incidental to the Contract.

A. Preconstruction Meeting. Meet with the Engineer for a Preconstruction Meeting before beginning the Work. At or before the meeting, submit the initial progress schedule to the Engineer. Prepare the schedule according to 108.03.A or, if included in the proposal, per the "Critical Path Method Project Schedule" pay item/proposal note.

Furnish a list of proposed subcontractors and material suppliers at or before the Preconstruction Meeting. If the Contractor fails to provide the required submissions at or before the Preconstruction Meeting, the Engineer may order the meeting suspended until they are furnished. Do not begin the Work until the meeting is reconvened and concluded or the Engineer gives specific written permission to proceed.

B. Initial Partnering Session. In conjunction with the Engineer, determine whether the Initial Partnering Session will be conducted as part of the Preconstruction Meeting or as a separate meeting. Partnering shall have its own agenda with specific time set aside to develop the necessary partnering protocols. Develop the Partnering agenda with the Engineer.

Identify and invite all stakeholders necessary to make the Project successful including utility companies, other transportation entities (i.e., railroads), community leaders, all Project participants including subcontractors.

During the Initial Partnering Session, consider developing Partnering teams consisting of County and Contractor senior personnel and Project personnel. Consider the following items for discussion:

1. Identifying and developing a consensus on project goals consistent with the contractual obligations, including specific goals concerning safety, quality, schedule, and budget.

2. Deciding how the teams will measure progress on Project goals.

3. Identifying any potential risks to the Project's success, mitigation strategies and an implementation plan for the appropriate strategies.

4. Defining key issues, project concerns, joint expectations, roles of key partnership leaders, lines of decision-making authority, and share relevant information to help determine the scope of the Partnering efforts.

5. Identifying any opportunities for project enhancement, enhancement strategies and a specific action plan for implementing strategies.

6. Developing a communication protocol to enhance communication on the Project.

7. Developing an issue identification and resolution process that identifies and attempts to resolve issues at the level closest to the work. The issue identification and resolution process will develop all the

necessary steps for issue elevation including Contractor Notification, Continuations of Work, Disputes and Claims defined in 108.02.F.

C. Progress Meetings. Hold monthly Progress Meetings unless the frequency is otherwise determined at the Preconstruction Meeting. Coordinate with the Engineer to determine agenda topics prior to each meeting. The purpose of Progress Meetings is to keep open communication between the Contractor and the Engineer. The senior personnel team is encouraged to participate in all Progress Meetings. Include Partnering as an agenda item at the Progress Meetings.

D. Post-milestone Meeting. In conjunction with the Engineer, determine whether the Post-milestone Meeting will be conducted as part of the Progress Meeting or as a separate meeting for multi-year, multi-phase, or projects with critical items of work or milestone dates. Consider discussing and updating items from the Initial Partnering Session in addition to items specific to the Project. All stakeholders should be invited to attend.

E. Partnering Monitoring. Monitor the progress of the Partnering relationship based on the goals decided during the Initial Partnering Session.

F. Contractor Notification, Continuations of Work, Disputes and Claims.

This specification represents the Cuyahoga County Department of Public Works' claims procedure for highway construction projects and shall be utilized by all contractors who seek additional money or time from Cuyahoga County in the form of a claim. Contractors are advised that they must exhaust this claims procedure prior to filing an action in court.

1. Notice of Claim

   Mitigation of any issue, whether caused by the County, Contractor, third-party or an intervening event, is a shared contract and legal requirement. Mitigation efforts include, but are not limited to, re-sequencing work activities, acceleration, and substitution of materials. The Contractor and Engineer must explore and discuss potential mitigation efforts in a timely manner.

   Contractor Initial Oral Notification. Provide immediate oral notification to the Engineer upon discovering a circumstance that may require a revision to the Contract Documents or may result in a dispute. Upon notification, the Engineer will attempt to resolve the identified issue as quickly as possible.

   Contractor Written Early Notice. If the Engineer has not resolved the identified issue within 2 working days after receipt of the oral notification, provide a written notice to the Engineer of any circumstance that may require a revision to the Contract Documents or may result in a dispute. This early notice must be given by the end of the second working day following the occurrence of the circumstance.

   The Engineer and Contractor shall maintain records of labor, equipment, and materials used on the disputed work or made necessary by circumstance. Such records will begin when early notice is received by the Engineer. Tracking such information is not an acknowledgement that the County accepts responsibility for payment of this disputed work.

   Continuation of Work. Continue with all Work, including that which is in dispute. The County will continue to pay for Work.

   Notice of Claim. In the event, after submission of Early Written Notice, the Contractor and the Engineer disagree as to the responsibilities of the parties under the contract concerning the circumstances, then the Engineer shall promptly advise the Contractor in writing of the Engineer's position. The Contractor shall submit to the Engineer in writing within ten (10) calendar days after the receipt of the Engineer's position, a Notice of Claim setting forth insofar as possible, the basis and the nature of the claim. The failure of the Contractor to submit a Notice of Claim within ten (10) calendar days constitutes a waiver of his right to any claim due to the "circumstances." The Engineer shall acknowledge receipt of the Notice of Claim in

writing within ten (10) calendar days of receipt of the Notice of Claim from the Contractor. The failure to so acknowledge by the Engineer will not affect the validity of the claim.

Estimates of Additional Costs and/or Time. Within ten (10) calendar days of the date of submission of the Notice of Claim, the Contractor shall submit in writing to the Engineer the Contractor's generalized estimate of the additional costs to be incurred and any additional time required. Some cost and time factors may be unknown, and it is understood that this estimate may be based on incomplete information. If the Contractor fails to submit his/her estimate of additional costs and/or any additional time required within ten (10) calendar days or such later date as agreed to with the Engineer, the claim is abandoned and waived.

2. Submission of Claim:

Time for Submission. As promptly as possible following the submission of the Notice of Claim, but in no event later than sixty (60) calendar days after substantially all the Contractor's costs are known to a reasonable certainty, the Contractor shall submit the claim to the Engineer. If the Contractor fails to submit the claim within said sixty (60) calendar days or such later date as agreed to with the Engineer, the claim is abandoned and waived.

Content of Claim. The claim shall be in sufficient detail to enable the Engineer to determine the basis for entitlement and the resulting costs. The following minimum information must accompany each claim submitted:

1. Detailed factual statement of the claim providing all necessary dates, locations, and items of Work affected by the claim.
2. The date actions resulting in the claim occurred or conditions resulting in the claim became evident.
3. A copy of the Contractor's "Notice of Claim" filed by the Contractor for the specific claim.
4. The name, title, and activity of each Cuyahoga County Department of Public Works employee knowledgeable about the facts that give rise to such claim.
5. The name, title, and activity of each Contractor employee knowledgeable about the facts that give rise to such claim.
6. The specific provisions of the Contract that support the claim and a statement why the provisions support the claim.
7. The identification of any pertinent documents and the substance of any material oral communications relating to the claim.
8. A statement whether the additional compensation or extension of time is based on the provisions of the Contract or an alleged breach of Contract.
9. If an extension of time is also sought, the specific days for which it is sought and the basis for such claim as determined by an analysis of the construction schedule.
10. The total additional compensation sought determined by tabulated specific costs per element of the claim and the basis used to determine the specific costs.

Any claim, which in the opinion of the Engineer is deficient in documentation shall either be returned to the Contractor with comments regarding the deficiencies or the Engineer may, at his/her option, request additional information. The Contractor shall either furnish the additional information requested by the Engineer within fifteen (15) calendar days of the request, or such later time as agreed to with the Engineer, or state in writing to the Engineer that he/she cannot or will not furnish such additional information, or the claim is abandoned and waived.

3. Review of Claims

All claims submitted will be subject to review by the Engineer. The Contractor, Subcontractor(s), or Supplier(s) shall cooperate with the Engineer and shall provide at a minimum, access to the following documents:

1. Daily time sheets and foreman's daily reports.
2. Union agreements, if any.
3. Insurance, welfare, and benefits records.
4. Payroll register.
5. Earnings records.
6. Payroll tax returns.
7. Material invoices, purchases orders, and all material and supply acquisition Contracts.
8. Material cost distribution worksheets.
9. Equipment records (list of company equipment, rates, etc.).
10. Vendor rental agreements and subcontractor invoices.
11. Subcontractor payment certificates.
12. Canceled checks (payroll and vendors).
13. Job cost report.
14. Job payroll ledger.
15. General ledger, general journal, (if used) and all subsidiary ledgers and journals together with all supporting documentation pertinent to entries made in these ledgers and journals.
16. Cash disbursements journal.
17. Financial statements for all years reflecting the operations on this project.
18. Income tax returns whether such records are maintained by the company involved, its accountant, or others.
19. Depreciation records on all company equipment.
20. All other documents used to develop costs for the Contractor's internal purposes in establishing the actual cost of owning and operating equipment.
21. All documents that reflect the Contractor's actual profit and overhead during the time the project was being performed and for each of the five years prior to the commencement of this project.
22. All documents related to the preparation of the Contractor's bid including the final calculations on which the bid was based.
23. Worksheets used to prepare the claim, establishing the cost components for items of the claim including, but not limited to, labor, benefits and insurance, materials, equipment, subcontractors, and all documents that establish the time periods, individuals involved, the hours and the rates for the individuals.

4. Decision of the Cuyahoga County Department of Public Works

   The Cuyahoga County Department of Public Works shall render a written decision within sixty (60) calendar days of the latest date of receipt of the claim or the date of receipt of the supplemental information requested by the Engineer. The decision shall have the prior approval of Cuyahoga County.

   The decision of the Cuyahoga County Department of Public Works, having the approval of Cuyahoga County, is administratively final. However, a Contractor who disagrees with the decision may pursue any available legal remedies.

5. No Contract Adjustment Without Notification.

   Except for the adjustments provided in Table 104.02-2, no contract adjustment for the benefit of the Contractor will be allowed unless the Contractor has given the proper Oral Notice, Early Written Notice and/or Notice of Claim.

G. Post Construction Meeting. The County will conduct a Post Construction Meeting with the Contractor prior to the project finalization if deemed necessary by the Engineer. The County will invite the design agency and any other stakeholders deemed necessary including utility companies, other transportation entities (i.e., railroads), community leaders, all Project participants including subcontractors performing critical work to attend this meeting.

Consider the following items for discussion:

1. Project Safety.

2. How were the goals evaluated or measured?

3. How were foremen / workers involved in the Partnering process?

4. How ere the subcontractors involved in the Partnering process?

5. How were relationships with key stakeholders managed?

6. Teambuilding activities or unique motivational activities.

108.03 Prosecution and Progress.

Start the Work according to 108.02 and 108.03A below. Notify the Engineer at least 24 hours before starting Work. If the prosecution of Work is suspended, notify the Engineer a minimum of 24 hours in advance of resuming operations.

Pursue the Work diligently and continuously as to complete the Project by the Completion Date.

A. Progress Schedule.

1. General. Furnish a bar chart progress schedule to the Area Construction Engineer for review at or before the Preconstruction Meeting. The Engineer will review the schedule and within 14 calendar days of receipt, will either accept the schedule or provide the Contractor with comments. Acceptance of the schedule does not revise the Contract Documents. Provide clarification or any needed additional information within 10 days of a written request by the Engineer. The County will withhold Estimates until the Engineer accepts the schedule. The Engineer will not measure or pay for the preparation of the schedule and schedule updates directly, but the cost of preparing and updating the schedule is incidental to all Contract Items.

a. Include the following Administrative Identifier Information:

(1) Project Number

(2) County Road Name/Route Number

(3) Project Limits

(4) PID Number (if applicable)

(5) Contract Notice to Proceed Date

(6) Completion Date

(7) Contractor's Name

(8) Contractor's Dated Signature

(9) County's Dated Acceptance Signature

Provide a working day schedule that shows the various activities of Work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the Completion Date. Show the order and the sequence for accomplishing the Work. Describe all activities in sufficient detail so that the Engineer can readily

identify the Work and measure the progress of each activity. The bar chart schedule must reflect the scope of work, required phasing, maintenance of traffic requirements, interim completion dates, the Completion Date, and other project milestones established in the Contract Documents. Include activities for submittals, working and shop drawing preparation, submittal review time for the County, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities. The schedule must be detailed on letter or legal sized paper.

b. Activity requirements are discussed in further detail as follows:

(1) Activity Description

Assign each activity an unambiguous descriptive word or phrase. For example, use "Excavate Area A," not "Start Excavation."

(2) Activity Original Duration

Indicate a planned duration in calendar days for each activity. Do not exceed a duration of 20 working days for any activity unless approved by the Engineer. Do not represent the maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.

2. Updated Progress Schedule. Submit an updated progress schedule when ordered by the Engineer. The Engineer may request an updated progress schedule when progress on the work has fallen more than 14 calendar days behind the latest accepted progress schedule. Information in the updated schedule must include a "% work completed" value for each activity.

3. Recovery Schedule. If the progress schedule projects a finish date for the Project more than 14 calendar days later than the Completion Date, submit a revised schedule showing a plan to finish by the Completion Date. The County will withhold Estimates until the Engineer accepts the revised schedule. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the Contractor.

108.04 Limitation of Operations.

Limit operations to prevent unnecessary inconvenience to the traveling public. If the Engineer concludes that the extent of the Contractor's Work unnecessarily inconveniences the public or concludes limiting operations are necessary to protect the existing or new construction from damage, the Engineer will require the Contractor to finish portions of Work in progress before starting new Work.

108.05 Character of Workers, Methods and Equipment.

Provide personnel with sufficient skills and experience to perform assigned tasks.

Ensure that no debarred individuals listed on the Federal website: www.epls.gov or State debarment list at the website: www.dot.state.oh.us/divisions/contractadmin/ act in any ownership, leadership, managerial, or other similar position that could influence the operations of an entity doing business with the County.

If the Engineer gives written notification that specific Contractor or subcontractor personnel are improperly performing the Work, intemperate, disorderly, or creating a hostile work environment, remove the identified personnel from the Project. Do not allow removed personnel to return to the Project without the Engineer's approval.

The Engineer may suspend the Work by written notice under this subsection for the following reasons:

A. The Contractor does not furnish sufficient skilled and experienced personnel to complete the Project by the Completion Date.

B. The Contractor does not remove personnel from the Project as directed in writing by the Engineer.

Use equipment of sufficient size and mechanical condition to complete the Project by the Completion Date. Ensure that the equipment does not harm the roadway, adjacent property, other highways, workers, or the public.

If the Contract Documents do not prescribe the methods and equipment required to accomplish the Work, determine the methods or equipment necessary to complete the Work according to the Contract.

If the Contract Documents specify methods and equipment to perform the Work, use such methods and equipment, unless others are authorized by the Engineer. Obtain the Engineer's written approval before substituting alternate methods or equipment. To obtain the Engineer's approval, submit a written description of the alternate methods and equipment proposed and an explanation of the reasons for making the change. The Engineer's approval of substitute methods and equipment does not relieve the Contractor of the obligation to produce Work according to 105.03. If after trial use of the substituted methods or equipment, the Engineer determines that the Work does not conform to the Contract Documents, then complete the remaining Work using the specified methods and equipment. Remove all deficient Work and replace it according to the Contract Documents, or take such other corrective action as directed by the Engineer. The Engineer's authorization to substitute alternative methods and equipment will not change the basis of payment for the construction items involved or the Contract Time.

108.06 Determining a Time Extension to the Completion Date and Payment for Excusable Delays.

A. General. The County will only extend the Completion Date if an excusable delay, as specified in 108.06.B or 108.06.D, delays Work on the critical path shown on the accepted progress schedule and impacts the Completion Date. The critical path is defined as the longest path of activities in the project that determines the project schedule completion date. The activities that make-up the critical path of activities are the "Critical Activities". Any extension of the Completion Date will be issued in writing by the Engineer.

Mitigation of any delay, whether caused by the County, Contractor, third-party or an intervening event, is a shared contract and legal requirement. Mitigation efforts include, but are not limited to, re-sequencing work activities, acceleration, and continuation of work through an otherwise planned shutdown period. The Contractor and Engineer must explore and discuss potential mitigation efforts in a timely manner.

The County will not evaluate a request for extension of the Completion Date unless the Contractor notifies the Engineer as specified in 108.02.F. Notification shall be in writing to the Engineer within 30 days following the termination of the event giving rise to the request and shall be accompanied by supporting analysis and documentation. The Engineer will evaluate the Contractor's analysis and determine the time extension due, if any. The Engineer will measure all time extensions in Calendar Days. For delays measured in Workdays, the Engineer will convert Workdays to Calendar Days by multiplying by 1.4 for a 5-day work week or less; 1.2 for a 6-day work week; and 1 for a 7-day work week; and extend the Completion Date by the resulting number of Calendar Days plus any holidays the Contractor does not normally work that occur in the extension period. When the conversion of Workdays to Calendar Days results in a decimal of 0.5 or greater, the Engineer will round the number of Calendar Days to the next highest whole number. When the conversion results in a decimal less than 0.5, the Engineer will delete the decimal portion of the Calendar Days.

The Engineer will not grant an extension of time for delays incurred from December 1 to April 30 unless the Contractor's accepted progress schedule depicts Work on the critical path occurring during this period.

The Engineer may order the Contractor to continue Work after November 30 and compensate the Contractor for costs incurred due to cold weather Work.

The Contractor's plea that insufficient time was specified is not a valid reason for an extension of time.

The County will relieve the Contractor from associated liquidated damages, as specified in 108.07, if the Engineer extends the Completion Date under 108.06.A.

The extended Completion Date shall then have the same standing and effect as though it was the original Completion Date.

If the Contractor contends that an excusable delay is also compensable, as specified in 108.06.D, submit a detailed cost analysis of the requested additional compensation along with the request for extension of Completion Date.

B. Excusable, Non-Compensable Delays. Excusable, non-compensable delays are delays that are not the Contractor's or the County's fault or responsibility. The Engineer will not grant additional payment for excusable, non-compensable delays.
The following are excusable, non-compensable delays:

1. Delays due to floods, tornadoes, lightning strikes, earthquakes, or other cataclysmic phenomena of nature.
2. Delays due to weather as specified in 108.06.C.
3. Extraordinary delays in material deliveries the Contractor or its suppliers cannot foresee or avoid resulting from freight embargoes, government acts, or area-wide material shortages. Delays due to the Contractor's, subcontractor's, or supplier's insolvency or mismanagement are not excusable.
4. Delays due to civil disturbances.
5. Delays from fires or epidemics.
6. Delays from labor strikes that are beyond the Contractor's, subcontractor's, or supplier's power to settle and are not caused by improper acts or omissions of the Contractor, subcontractor, or supplier.
7. Added quantities that delay an activity on the critical path.
8. All other delays not the Contractor's and County's fault or responsibility.

C. Extension to the Completion Date for Weather or Seasonal Conditions. A weather day is defined as a workday that weather or seasonal conditions reduced production by more than 50 percent on items of work on the critical path. Submit the dates and number of weather days in writing to the Engineer at the end of each month. In the event the Contractor fails to submit weather days at the end of each month the Engineer will determine the dates and number of weather days from project records.

Delays caused by weather and seasonal conditions should be anticipated and will be considered as the basis for an extension of time when the Contractor's accepted progress schedule depicts Work on the critical path and the actual workdays lost exceeds the number of work days lost each month as determined by Table 108.06-1.

TABLE 108.06-1

Month	Number of Workdays Lost Due to Weather
January	8
February	8
March	7
April	6
May	5
June	5
July	4
August	4
September	5
October	6
November	6
December	6

The Engineer will not consider weekends and holidays as lost workdays unless the Contractor normally works those days or unless the Engineer directs the Contractor to work those days.

D. Excusable, Compensable Delays. Excusable, compensable delays are delays that are not the Contractor's fault or responsibility and are the County's fault or responsibility or are determined by judicial proceeding to be the County's sole responsibility or are the fault and responsibility of a local government. For the following excusable, compensable delays, the Engineer will extend the Completion Date if the conditions specified in 108.06.A are met:

1. Delays due to revised Work as specified in 104.02.B, 104.02.D, or 104.02.F.
2. Delays due to utility or railroad interference within the Project limits.
3. Delays due to an Engineer-ordered suspension as specified in 104.02.C.
4. Delays due to acts of the government or a political subdivision other than the County; however, these compensable delay costs are limited to escalated labor and material costs only, as allowed in 109.05.D.2.b and 109.05.D.2.d.
5. Delays due to the neglect of the County or its failure to act in a timely manner.

Compensation for excusable, compensable delays will be determined by the Engineer according to 109.05.D.1 and 109.05.D.2.

E. Non-Excusable Delays. Non-excusable delays are delays that are the Contractor's fault or responsibility. All non-excusable delays are non-compensable.

F. Concurrent Delays. Concurrent delays are separate critical delays that occur at the same time. When a non-compensable delay is concurrent with a compensable delay, the Contractor is entitled to additional time but not entitled to additional compensation.

108.07 Failure to Complete on Time.

If the Contractor fails to complete the Work within the time or times allowed by the contract, the Cuyahoga County Department of Public Works, if satisfied that the Contractor is carrying the Work forward with reasonable progress, and the Cuyahoga County Department of Public Works deems it to be in the best interest of the public, may allow the Contractor to continue in control of the Work. It shall be necessary for the

Contractor to make written application to the Cuyahoga County Department of Public Works in order to warrant such continuance. Payments to the Contractor for Work performed and materials furnished will be made.

When the Work is not completed within the time or times allowed by the contract and the Contractor is permitted to remain in control, the Work shall be prosecuted at as many different places, at such times and with such forces as the Cuyahoga County Department of Public Works may request. The Contractor may be required to provide a written plan for the completion of the Work.

For each calendar day that any Work shall remain uncompleted after the contract completion date or dates, the sum specified herein will be deducted from any money due the Contractor, not as a penalty but as liquidated damages; provided, however, that due account shall be taken of any adjustment of the completion date or dates granted under the provisions of 108.06. In the event one or more interim completion dates are specified without specific separate liquidated damages, the amount set forth in the Schedule of Liquidated Damages will separately apply to each interim date. In the event a period of liquidated damages for an interim completion date overlaps a subsequent completion date, the higher rate of liquidated damages will apply for the duration of the overlap.

Permitting the Contractor to continue and finish the Work or any part of it after the date or dates fixed for its completion, or after the date or dates to which completion may have been extended, will in no way operate as a waiver on the part of Cuyahoga County or the Cuyahoga County Department of Public Works of any of their rights under the contract.

The County may stop deducting liquidated damages when:

A. The Work is substantially complete and the project is available for use as intended by the contract.

B. The Contractor is diligently pursuing the remaining Work.

C. The Work remaining will not interfere with the intended use of the project and will not impact traffic. For the limited purposes of assessing liquidate damages, the closing of a shoulder is not considered an impact upon traffic.

D. All contract safety items are complete and operational. These safety items include but are not limited to signs, pavement markings, guardrail, attenuators, and signals. Raised pavement markers (RPM) are required safety items if the roadway section involved had RPMs before the project started.

E. Deemed reasonable and appropriate by the Cuyahoga County Department of Public Works.

TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for Each Calendar Day of Overrun in Time
From More Than	To and Including	
$0.00	$500,000	$500
$500,000	$2,000,000	$1,000
$2,000,000	$10,000,000	$1,500
$10,000,000	$50,000,000	$2,600
Over 50,000,000		$3,200

108.08 Unsatisfactory Progress and Default of Contractor.

The Engineer will notify the Contractor in writing of unsatisfactory progress for any of the following reasons:

A. The Contractor has not commenced the Work by the dates established in the schedule.
B. The Contractor does not proceed with the Work in a manner necessary for completion of the Project by the Completion Date.
C. The Contractor is performing the Work improperly.
D. The Contractor abandons, fails, or refuses to complete the Work.
E. Any other reason the Engineer believes jeopardizes completion of the Work by the Completion Date.

If the Contractor does not respond to the satisfaction of the Engineer, the Engineer may declare the Contractor in default and may notify the Contractor and Surety that the responsibility to complete the Work is transferred to the Surety. Upon receipt of this notification, the Contractor's right to control and supervise the Work will immediately cease. In such a case, the Engineer will proceed as specified in ORC 5555.68. The defaulted Contractor will not be compensated for costs resulting from the default and is not eligible to be retained by the Surety to complete the Work. If it is determined that the County's default of the Contractor according to 108.08 is wrongful, then the default will revert to a termination of the Contract according to 108.09.

108.09 Termination of Contract for the Convenience of the County.

Cuyahoga County may terminate the contract for their convenience at any time. The Contractor will be compensated under 109.04 and 109.05 for added expense not including anticipated profits for termination of the contract for the convenience of Cuyahoga County. This subsection is subject to the limitations of ORC 5555.69.

108.10 Payroll Records.

Keep payroll records as specified in ORC 4115.07 or as required by Federal law.

Authorized representatives of Cuyahoga County or the Cuyahoga County Department of Public Works may inspect the certified payroll and other payroll records. Upon completion of the Work and before receiving the final estimate and when required by ORC 4115.07, submit an affidavit stating that wages have been paid according to the minimum rates specified in the Contract Documents.

109 ACCEPTANCE, MEASUREMENT AND PAYMENT

109.01 Measurement of Quantities.

The County will measure the quantities of Work and calculate payments based on the method of measurement and basis of payment provisions provided in these Specifications. When the following units of measure are specified, the County will measure quantities as described below unless otherwise specified in the Contract Documents. The accuracy of individual pay item estimate payments will be one decimal more accurate than the unit measure denoted in the pay item.

Lump Sum. Not measured. Describes payment as reimbursement for all resources necessary to complete the Work. When a complete structure or structural unit is specified as the unit of measurement, the unit will include all necessary fittings and accessories.

Each. Measured by the number of individual items of Work completed.

Foot (Meter). Measured parallel to the longitudinal base or foundation upon which items are placed, or along the longitudinal surface of the item. Measured vertically to the nearest 0.1 foot (0.01 m), with a minimum vertical measurement of 1 foot (0.10 m), at each unit.

Square Yard or Square Foot (Square Meter). Measured by a two-dimensional area method on the surface of the item.

M Square Feet. One thousand square feet.

Cubic Yard (Cubic Meter). Measured by a three-dimensional volume method. Measure all "loose material" or material "measured in the vehicle" by the cubic yard (cubic meter). Haul material "measured in the vehicle" in approved vehicles and measure in the vehicle at the point of delivery. For this purpose, use approved vehicles of any type or size satisfactory to the Engineer, provided the vehicle's bed is of such type that the actual contents are readily and accurately determined. Unless all approved vehicles on a job are of uniform capacity, each approved vehicle must bear a legible identification mark indicating the specific approved capacity. The Inspector may reject all loads not hauled in such approved vehicles.

Cubic Yard (Cubic Meter) for Asphalt Concrete. Measure as specified in 401.21.

Acre (Hectare). Measured by a two-dimensional area method on the surface to the nearest 0.1 acre (0.05 ha).

Pound (Kilogram). Measured by actual item net weight avoirdupois (mass).

Ton (Metric Ton). The term "ton" means the short ton consisting of 2000 pounds avoirdupois. The term "metric ton" means 1000 kilograms. Weigh all materials that are proportioned by weight on accurate and approved scales that are operated by competent, qualified personnel at locations approved by the Engineer. However, car weights will not be acceptable for materials to be passed through mixing plants. If trucks are used to haul material being paid for by weight, weigh the empty truck at least once daily and as the Engineer directs and only if the weight of the truck is used in determining the ticket weight. Place a plainly legible identification mark on each truck bearing the weight of the truck.

For Work on a tonnage basis, file with the Engineer receipted freight bills for railroad shipments and certified weight-bills when materials are received by any other method, showing the actual tonnage used. For Work on a volume basis, itemize evidence of the volume used.

Gallon (Liter). Measured by actual item liquid volume. The County will measure the following materials by the gallon (liter) at the following temperatures:

Temperatures	Items
60 °F (16 °C)	Creosote for Priming Coat, Creosote Oil, Creosote Solutions for Timber Preservatives, Asphalt Primer for Waterproofing, and Liquefier
100 °F (38 °C)	RC, MC Asphalt Emulsions, CBAE, Primer 20, and Primer 100
300 °F (149°C)	Asphalt Binder

Measure tank car outage of asphalt material at its destination before any material has been removed from the tank car according to Supplement 1060.

Convert the net weight of asphalt material shipments to gallons (liters) at the specified pay temperature according to Supplement 1060.

Convert the gallons (liters) at the measured temperature to gallons (liters) of asphalt material at the specified pay temperature according to Supplement 1060.

M Gallon. One thousand gallons.

Thousand Board Feet, MBF (Cubic Meter). Measure timber by MBF (cubic meter) actually incorporated in the structure. Base the measurement on nominal widths, thicknesses, and the extreme length of each piece.

Standard Manufactured Items. When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by size, unit weight, section dimensions, etc., such identification will be to nominal weights or dimensions set by the industry.

109.02 Measurement Units.

The County will measure using either English or metric units as indicated in the Contract Documents. Use the Tables 109.02-1 and 109.02-2 to convert units when required. If Tables 109.02-1 and 109.02-2 do not provide a required factor, then use the appropriate factor provided in the IEEE/ASTM SI 10.

TABLE 109.02-1 ENGLISH TO SI (METRIC) CONVERSION FACTORS

Symbol	When You Know	Multiply By	To Find	Symbol
		Length		
mil	mils	25.4	micrometers	µm
in	inches	25.4	millimeters	mm
ft	feet	0.3048	meters	m
yd	yards	0.9144	meters	m
mi	miles	1.609347	kilometers	km
		Area		
in^2	square inches	645.16	square millimeters	mm^2
ft^2	square feet	0.09290304	square meters	m^2
yd^2	square yards	0.8361274	square meters	m^2
ac	acres	0.4046873	hectares	ha
ac	acres	4046.873	square meters	m^2
mi^2	square miles	2.589998	square kilometers	km^2
		Volume		
fl oz	fluid ounces	29.57353	milliliters	mL
gal	gallons	3.785412	liters	L
ft^3	cubic feet	0.02831685	cubic meters	m^3
yd^3	cubic yards	0.7645549	cubic meters	m^3
		Mass		
oz	ounces	28.34952	grams	g
lb	pounds	0.4535924	kilograms	kg
T	2000 pounds	0.9071847	metric tons	t
		Temperature		
ºF	Fahrenheit	C = (F-32)/1.8	Celsius	ºC
		Illumination		
fc	foot-candles	10.76391	lux	lx
fl	foot-lamberts	3.426259	candelas per square meter	cd/m^2
		Force and Pressure or Stress		
lbf·ft	pounds-force foot	1.355818	newton meter	N·m
lbf	pounds force	4.448222	newtons	N
lbf/ft^2 (psf)	pounds force per square foot	47.88026	pascals	Pa
lbf/in^2 (psi)	pounds force per square inch	0.006894757	megapascals	MPa

TABLE 109.02-2 SI (METRIC) TO ENGLISH CONVERSION FACTORS

Symbol	When You Know	Multiply By	To Find	Symbol
		Length		
μm	micrometers	0.03937	mils	mil
mm	millimeters	0.03937	inches	in
m	meters	3.28084	feet	ft
m	meters	1.093613	yards	yd
km	kilometers	0.62137	miles	mi
		Area		
mm^2	square millimeters	0.00155	square inches	in^2
m^2	square meters	10.76391	square feet	ft^2
m^2	square meters	1.19599	square yards	yd^2
ha	hectares	2.4710437	acres	ac
m^2	square meters	0.000247	acres	ac
km^2	square kilometers	0.3861	square miles	mi^2
		Volume		
mL	milliliters	0.033814	fluid ounces	fl oz
L	liters	0.264172	gallons	gal
m^3	cubic meters	35.31466	cubic feet	ft^3
m^3	cubic meters	1.30795	cubic yard	yd^3
		Mass		
g	grams	0.035274	ounces	oz
kg	kilograms	2.204622	pounds	lb
t	metric tons	1.1023114	2000 pounds	T
		Temperature		
ºC	Celsius	F = 1.8C + 32	Fahrenheit	ºF
		Illumination		
lx	lux	0.09290304	foot-candles	fc
cd/m^2	candelas per square meter	0.29186352	foot-lamberts	fl
		Force and Pressure or Stress		
N·m	newton meters	0.7375621	pounds-foot force	lbf ft
N	newtons	0.22480892	pound force	lbf
Pa	pascals	0.02088543	pounds force per square foot	lbf/ft^2 (psf)
MPa	megapascals	145.03774	pounds force per square inch	lbf/in^2 (psi)

109.03 Scope of Payment.

Payment of the Contract Price is full compensation for all resources necessary to complete the contract item and maintain the Work. Assume liability for risk, loss, damage, or expense resulting from the Work. The Contract Price and Contract Time shall only be changed by written Change Order or as determined by the County in writing in accordance with the contract documents.

109.04 Compensation for Altered Quantities, Eliminated Items or Termination of the Contract for Convenience of the County.

If the agreed quantities of contract items vary from the quantities in the Contract, the County will make payment at the original Contract unit prices for the agreed quantities of Work.

A. If an item is eliminated in accordance with 104.02.E or the contract is terminated in accordance with 108.09 the County will pay the following in addition to that provided by 104.02.D:

1. Restocking charges supported by paid invoices and an additional 5 percent markup on the compensation for overhead and profit.

2. The cost of material transferred to the County or a local government agency in lieu of restocking or disposal. The allowed compensation is the paid invoice cost plus 15 percent markup, but no more than the unit bid price for the reference number involved.

3. Hauling costs, if not included in restocking charges, for returned material and for material delivered to the County.

B. If the project is terminated for convenience of the County, the County will negotiate compensation with the Contractor for actual costs incurred as a result of the termination. The County will pay for Extra Work as stipulated in approved Extra Work Change Orders or written authorizations subject to the limitations set forth in ORC 5555.69. Such authorizations for emergencies and to avoid Project delays are in advance of an approved Extra Work Change Order and commit the County only to the terms of the authorizations. The County will pay for Extra Work after the approval of the subsequent Change Order.

109.05 Changes, Extra and Force Account Work.

A. General. If the County revises the Contract under 104.02, 105.07, 105.10, 105.13, 107.10, 107.14, 107.15, 108.09, 109.06, or 109.07, the County will pay for changes and Extra Work with a Supplemental Agreement using the sequence specified in 109.05.B through 109.05.E.

In establishing the method of payment for contract changes or extra work orders, force account procedures shall only be used when strictly necessary, such as when agreement cannot be reached with the contractor on the price of a new work item, or when the extent of work is unknown or is of such character that a price cannot be determined to a reasonable degree of accuracy. The reason or reasons for using force account procedures shall be documented.

Unless otherwise stated in 109.05, the compensation provided in 109.05.B through 109.05.E constitutes payment in full for all changes and Extra Work completed by original Contract Price, agreed unit price, agreed lump sum price, and for work performed on a force account basis, including:

1. Administration.
2. Superintendence.
3. Project and field office overhead.
4. Home office overhead.
5. Use of tools and equipment for which no rental is allowed.
6. Profit.
7. Taxes other than sales tax.
8. Premiums on insurance including additional premiums for Commercial General Liability Insurance required by 107.12.B and any additional coverage carried by the Contractor or subcontractor, excluding pollution and railroad General Liability Insurance. The County will pay the Contractor's pollution and railroad liability insurance premiums, if required by the contract, by a separate Change Order for the cost of the premium without any mark up. When the Contractor's or subcontractors' basic rate for General Commercial Liability Insurance required by 107.12.B is greater than 5 percent of payroll, the County will pay directly without mark up the portion of the premium in excess of 5 percent and provide copies of paid premiums.

Sales tax will not be allowed on any item for which tax exemption was obtained.

B. Negotiated Prices. Negotiated prices for changes and Extra Work shall be comparable to prices that would have resulted from a competitive bid contract. The Engineer and Contractor will negotiate agreed unit or lump sum prices using one or more of the following methods:

1. Original Contract prices for similar work but adjusted for:

   a. increased or decreased material costs specified in 109.05.C.3.

   b. increased or decreased labor costs specified in 109.05.C.2

   c. increased or decreased equipment costs specified in 109.05.C.4

   Adjustments of these prices for inflation or mark up for subcontractor work is not allowed.

2. State-wide average unit price awarded for the item or items as listed in ODOT's annual "Summary of Contracts Awarded." These prices may be adjusted for inflation using factors issued by ODOT's Office of Construction Administration. No mark up for subcontractor work is allowed.

3. Average price awarded on three different projects of similar work and quantity. These prices may be adjusted for inflation using factors issued by ODOT's Office of Construction Administration. No mark up for subcontractor work is allowed.

4. Cost analysis of labor, material, equipment, and mark ups as allowed in 109.05.C.

5. For the cost of compensable delays as defined in 108.06, prepare a cost analysis as allowed by 109.05.D.

Provide proposed pricing and cost justification for changes or Extra Work within 5 business days after the County's request. The County will respond within 5 business days after receipt of the Contractor's proposal. The County and the Contractor can mutually agree to extend these 5-day time limits.

If the County negotiates with the Contractor but does not agree on a price adjustment, the Engineer may direct the Contractor to perform all or part of the revised Work under force account.

C. Force Account.

1. General. The Engineer may direct the Contractor to perform the revised Work under force account. Submit a written proposal and estimated costs for the Work, including the planned equipment, materials, labor, and a work schedule.

The County will pay the Contractor as specified in 109.05.C as full compensation for performing the force account Work. The Project and Contractor personnel will document the labor and equipment used on the force account work on a Daily Force Account Record. At the end of each Workday, the Project and Contractor personnel will compare and sign the Daily Force Account Record. The County will make no force account payment before the Contractor submits an itemized statement of the costs for that work.

The Engineer will examine and, if found to be acceptable, approve all rates and costs submitted by the Contractor.

Provide the following content in itemized statements for all force account Work:

a. Name, classification, date, daily hours, total hours, rate, and amount for all labor.

b. Designation, dates, daily hours, total hours of actual operation and idle time, Blue Book rate with reference or category, and amount for each unit of equipment and the applicable Blue Book hourly operating cost for each unit of equipment and invoices for all rental equipment. The designation includes the manufacturer's name or trademark, model number, and year of manufacture.

c. Quantities of materials and prices.

d. Transportation charges on materials, free on board (F.O.B.) at the job site.

e. Cost of workers' compensation insurance premiums, all applicable insurance premiums, unemployment insurance contributions, and social security tax and fees or dues required by a collective bargaining agreement. Express each of these items of cost as a percentage of payroll, except fees or dues, which should be expressed as a cost per hour.

f. Documentation showing payment for all surveying, professional, or similar specialized Work not normally a part of a County contract.

g. If materials are taken from Contractor's stock and original receipted invoices for the materials and transportation charges do not exist, provide an affidavit and certify all of the following:

(1) The materials were taken from the Contractor's stock.
(2) The quantity shown was actually used for the force account Work.
(3) The price and transportation costs represent the actual cost to the Contractor.

h. Documentation showing payment to trucking firms and owner-operators. Submit documentation showing owner-operations status. When the trucking is subject to prevailing wage, submit payroll and equipment usage records according to 109.05.C.1.a, 109.05.C.1.b, and 109.05.C.1.e.

i. Provide "receipted invoices" for all costs substantiated by an invoice.

If only part of the expenditure represented by an invoice is applicable to force account work, or if the invoice represents expenditure for more than one item of work, clearly indicate the actual amount of expenditure applicable to each item of work.

2. Labor. The County will pay the wages and fringe benefits currently in effect for each hour the Work is performed by all labor employed in the Work and all foremen in direct charge of the specific operation. The County will pay an additional 38 percent markup on these wages and benefits. "Fringe benefits" are the actual costs paid to, or on behalf of, workmen by reason of health and welfare benefits, pension fund benefits, or other benefits, when such amounts are required by prevailing wage laws or by a collective bargaining agreement or other employment contracts generally applicable to the classes of labor employed on the Project.

The County will pay the actual itemized cost, without markup, of the following payroll taxes and legally required insurances:

a. Social Security Tax.

b. Medicare Tax.

c. Ohio Workers' Compensation Premiums.

d. State and Federal Unemployment Insurance.

e. Longshore and Harborworkers' Compensation Insurance for Work from a barge or ship, or unloading material from a barge or ship.

Provide itemized statements in addition to the documentation requirements for all labor including the name, classification, date, daily hours, total hours, rate, and amount. If any person is paid more than the one rate, a separate listing shall be made for that person for each rate paid. Provide itemized statements for Ohio Workers' Compensation insurance premiums, all applicable insurance premiums, State and Federal Unemployment Insurance contributions, and Social Security Tax and fees or dues required by a collective bargaining agreement. Express each of these items of cost as a percentage of payroll, except fees or dues, which shall be expressed as a cost per hour.

Instead of itemizing the cost of Social Security Tax, Ohio Workers' Compensation, and State and Federal Unemployment Insurance, the Contractor may elect to receive as compensation for these payroll taxes and premiums, an amount equal to 22 percent of the paid wages. If the Contractor pays fringes directly to the worker in lieu of paying into a fringe benefit program, then the County will treat these fringe payments as paid wages when calculating the allowed 22 percent compensation.

The County will pay, without markup, the actual itemized cost of fees and dues paid to labor unions or to business associations when they are based on payroll hours and required by a collective bargaining agreement.

The County will not pay for wages or benefits for personnel connected with the Contractor's forces above the classification of foreman that have only general supervisory responsibility for the force account Work.

If the foreman or timekeeper is employed partly on force account Work and partly on other Work, the Contractor shall prorate the number of hours between the force and non-force account Work according to the number of people on each task as shown on payrolls.

The County will pay the prevailing wage and fringe rates that apply to the Project for the classifications required for Extra Work. The Contractor must provide payroll records for pay rates higher than the prevailing wages and establish that the higher than prevailing rates are paid for original Contract Work. The County will pay for foremen and time keepers not covered by prevailing wages not more than the salaried rate they receive when engaged in original Contract Work.

The County will pay actual costs for subsistence and travel allowances when such payments are required by the collective bargaining agreement or other employment contracts applicable to the classes of labor employed on the Project. The County will not pay a percent markup on these costs.

3. Materials. The County will pay the Contractor's actual invoice costs, including applicable taxes and actual freight charges, for Engineer-approved materials the Contractor uses in force account Work. The County will pay an additional 15 percent markup on these costs.

Freight or hauling costs charged to the Contractor and not included in unit prices shall be itemized and supported by invoices. The cost of owned or rented equipment used to haul materials to the project is not part of the materials cost. Such equipment, when used for hauling materials, shall be listed under cost of equipment.

Provide itemized statements in addition to the documentation requirements for all equipment including the quantity and price of each material and transportation charges free on board (F.O.B.) at the job site. Attach invoices to support the quantities of materials used, unit prices paid and transportation charges.

If the Contractor uses materials from the Contractor's stock and original receipted invoices for the materials and transportation charges do not exist, the County and the Contractor will agree on a price that represents the actual cost to the Contractor. Provide an affidavit and certify all of the following:

a. The materials were taken from the Contractor's stock.
b. The quantity shown was actually used for the force account work.
c. The price and transportation costs represent the actual cost to the Contractor.

Do not incorporate materials into the Work without a price agreement.

4. Equipment.

a. General. The County will pay the Contractor's costs for equipment the Engineer deems necessary to perform the force account Work for the time directed by the Engineer or until the Contractor completes the force account Work, whichever happens first. The County will pay the Contractor the established rates for equipment only during the hours that it is operated, except as otherwise allowed elsewhere in these Specifications. The County will pay for non-operating hours at the idle equipment rate as specified in 109.05.C.4.c. Report equipment hours to the nearest 1/2 hour. The established equipment rates in these Specifications include compensation for overhead and profit except as otherwise specified.

The County will pay for use of Contractor-owned equipment the Engineer approves for force account Work at established rates. The County will pay the rates, as modified in 109.05.C.4.b, given in the Equipment Watch Cost Recovery (formerly Rental Rate Blue Book) by Equipment Watch, a division of Penton Business Media, Inc.

Tool trucks will be allowed for compensation if they are used at the force account site. Only the tools used from the tool truck will be allowed for compensation. Tools in the tool truck that are not used in the force

account work will not be compensated. A tool trailer that remains at the Contractor's office or yard will not be allowed on the force account work. Tool trailers that are taken to the force account site will be allowed for compensation along with the tools used on the force account work that were taken from the trailer.

Provide, and the Engineer will confirm, the manufacturer's ratings and manufacturer-approved modifications required to classify equipment for rental rate determination. For equipment with no direct power unit, use a unit of at least the minimum recommended manufacturer's rating.

The County will not pay rental for small tools or equipment that show a daily rate less than $5.00 or for unlisted equipment that has a value of less than $400.

Treat traffic control devices used in Maintaining Traffic and owned by the Contractor as owned equipment. Allowed rates for common traffic control devices and concrete barrier that are not listed in the Blue Book will be as determined by the County.

Use Engineer-approved equipment in good working condition and providing normal output or production. The Engineer may reject equipment not in good working condition or not properly sized for efficient performance of the Work.

For each piece of equipment used, whether owned or rented, provide the Engineer with the following information:

(1) Manufacturer's name or trademark.
(2) Equipment type.
(3) Year of manufacture.
(4) Model number.
(5) Type of fuel used.
(6) Horsepower rating.
(7) Attachments required, together with their size or capacity.
(8) All further information necessary to determine the proper rate.
(9) Dates, daily hours, total hours of actual operation and idle time,
(10) Blue Book rate with reference or category,
(11) Amount
(12) Applicable Blue Book hourly operating cost
(13) Invoices for all rental equipment.

b. Hourly Owned Equipment Rates. The base rate for the machine and attachments represent the major cost of equipment ownership, such as depreciation, interest, taxes, insurance, storage, and major repairs. The hourly operating rate represents the major costs of equipment operation, such as fuel and oil lubrication, field repairs, tires, expendable parts, and supplies.

For all equipment used on force account Work, determine, and have the County confirm, the hourly owned equipment rates as follows:

$$HOER = [RAF \times ARA \times (R / 176)] + HOC$$

Where:

HOER = hourly owned equipment rate
RAF = regional adjustment factor shown in the Blue Book
ARA = age rate adjustment factor shown in the Blue Book
R = current Blue Book monthly rate
HOC = estimated hourly operating cost shown in the Blue Book

However, compensation for equipment normally used on a 24 hours per day basis will not exceed the monthly rate plus adjustments and operating costs. The Contractor will be paid no more than the monthly rate plus

adjustments and operating costs for a single piece of equipment regardless of the number of Force Accounts the piece of equipment is used in during that month.

The rate adjustment factor assigned to any attachment will be the yearly factor as determined for the base equipment.

When multiple attachments are included with the rental equipment, only the attachment having the highest rental rate will be eligible for payment, provided that the attachment has been approved by the Engineer as being necessary to the force account Work.

When a piece of owned equipment is not listed in the Blue Book, use the rate for similar equipment found in the Blue Book or use 6 percent of the purchase price as the monthly rate (*R*) and add the hourly operating rate found in the Blue Book for similar equipment of the same horsepower.

For equipment brought to the Project exclusively for force account Work and on the Project for less than a month, multiply the monthly rate (*R*) by the factor listed below:

TABLE 109.05-1

Working Hours	Factor
Less than or equal to 8.0	2.00
8.1 to 175.9	2.048 - (hours/168)
176 or greater	1.00

The term "WORKING HOURS," as used in Table 109.05-1, includes only those hours the equipment is actually in operation performing force account Work; apply the factor, as determined above, to these actual working hours only. Calculate compensation for any idle time according to 109.05.C.4.c without application of the factor.

The County will pay as working equipment for the entire Workday equipment used intermittently during the Workday. The following criteria qualify for intermittently used equipment:

(1) Equipment dedicated to the force account exclusively all day and not used on bid work.

(2) Equipment works before and after the intermittent idle period and its total working time during the Workday is at least 2 hours.

Equipment that is captive to the force account work (i.e., it must remain at the force account site), but does not qualify for intermittently used owned equipment, is paid as idle equipment according to Section 109.05.C.4.c. for the time it is not working.

c. Hourly Idle Equipment Rate. For equipment that is in operational condition, on site, and necessary for force account Work, but is idle, the County will pay an hourly idle equipment rate. The procedure to determine the hourly idle equipment rate for Contractor owned equipment is as follows:

$$HIER = RAF \times ARA \times (R / 176) \times (1/2)$$

Where:

HIER = Hourly idle equipment rate.
RAF = Regional adjustment factor shown in the Blue Book.
ARA = Age rate adjustment factor shown in the Blue Book.
R = Current Blue Book monthly rate.

If rented equipment necessary for force account Work is idle, the County will pay the Contractor for the actual invoiced rates prorated for the duration of the idle period. The actual invoiced rates must be reasonably in line with the Blue Book rates and approved by the Engineer. The County will pay a 15 percent markup for overhead and profit for the actual invoiced rates during the idle period.

The County will not pay idle owned equipment costs for more than 8 hours in a 24-hour day or 40 hours in a week.

The County will not pay for inoperable equipment.

The Engineer may order specific equipment to the site up to 5 days before its planned usage. If this equipment is not used for other Work, the County will pay for it as idle equipment until used.

The County will pay for the cost of idle owned or rented equipment when the Work was suspended for the convenience of the County. The County will pay as working equipment for the entire Workday equipment used intermittently during the Workday. The County will not pay the cost of idle equipment when the Work was suspended by the Contractor for the Contractor's own reasons.

The County will only pay for the number of Calendar Days during the existence of the suspension. The County will not compensate the Contractor for days that the Engineer determined were lost to weather.

The County will only pay for equipment physically located at the Project site that was received to prosecute the scheduled Work during the delay.

Compensation for idle equipment will stop at the completion of the force account Work or at the end of the suspension of Work.

d. Rented Equipment. The County will pay a 15 percent markup for overhead and profit for all rented equipment, its corresponding Blue Book hourly operating costs, and State and Local sales tax.

(1) Equipment Rented Solely for Force Account Work. If the Contractor rents or leases equipment from a third party exclusively for force account Work, the County will pay the actual invoiced amount. The actual invoiced rates must be reasonably in line with the Blue Book and approved by the Engineer. The County will pay a 15 percent markup for overhead and profit for all rented equipment paid for by the actual invoices. Add the Blue Book hourly operating cost to the marked up actual invoiced rates.

(2) Equipment Rented for Original Contract Work, but Used for Force Account Work. If the Contractor uses rented equipment currently on the Project for original Contract Work to perform force account Work, then determine the hourly outside-rented equipment rate as follows:

$HRER = (HRI \times 115\%) + HOC$

Where:

HRER = hourly rented equipment rate

HRI = hourly rental invoice costs prorated for the actual number of hours that rented equipment is operated solely on force account Work. Use a monthly invoice rate divided by 176, a weekly invoice rate divided by 40, or a daily invoice rate divided by 8.

HOC = hourly operating cost shown in the Blue Book

The County will not compensate for rental rates that exceed the Blue Book rates unless approved in advance of the Work by the Engineer.

e. Moving of Equipment. The County will also pay for the time required to move needed equipment to the location of the force account Work and to return it to its original location. The County will pay for loading and transportation costs instead of moving time if equipment is moved by means other than its own power. Moving time back to the original location or loading and transportation costs will not be allowed if the equipment is used at the site of the force account Work on contract items or related Work.

The County will consider the actual cost of transferring the equipment to the Project and returning it to the original location as an additional expense and pay for it as specified, for equipment moved on the Project exclusively for force account Work.

The Engineer will confirm the original location of the equipment before the Contractor moves and uses it for force account Work.

If the equipment is transported by a common carrier, the allowance is the invoiced amount paid for the freight plus 15 percent. However, if the Contractor's forces transport the equipment, the allowable compensation will be Blue Book rate of the hauling unit and hourly Blue Book operating cost plus the driver's wages and the cost of loading and unloading the equipment calculated according to 109.05.C.2.

5. Foreman's Transportation. The County will pay the Blue Book rate for every hour the foreman's truck is on the force account site or moving to or from the site. This rate includes equipment cost, fuel, and lubricants, overhead, profit, and mobile phone or two-way radios.

6. Subcontract Work. For Work performed by an approved subcontractor, the County will pay an amount to cover administrative costs of 8% on the first $10,000 of work and 5% for work in excess of $10,000 as provided in 109.05.C.2 through 109.05.C.5. No additional mark-up is allowed for work of a sub-subcontractor or trucking services employed by a subcontractor.

7. Final Adjustment to Premium for Contract Bonds: The final bond premium amount for the payment and performance bonds will be computed based on the actual final contract value. For the purpose of computing a bond premium adjustment the actual final contract value is defined as the whole sum of money, excluding any bond premium adjustment, which is passed from the County to the contractor as a result of the completion of the Work. If the actual final contract value is different from the original contract value, the premium shall be adjusted accordingly; either by refund of part of the original bond premium by the contractor if the original contract value is larger than the actual final contract value; or by payment of additional bond premium by the County if the original contract value is smaller than the actual final contract value. Additional payment by the County or refund by the contractor will be based on the difference between the invoiced bond premium for the original contract value and the invoiced bond premium for the actual final contract value without any markup. A final bond premium adjustment will not be made when the actual final contract value differs from the original contract value by less than $ 40,000.00.

8. Trucking.

a. Trucking firms and owner operators not subject to prevailing wage will be paid at the invoiced cost plus 8% on the first $10,000 of trucking and 5% for trucking in excess of $10,000 to cover administrative costs.

b. Trucking that is subject to the prevailing wage law will be compensated according to 109.05.C.1, 109.05.C.2, 109.05.C.4, 109.05.C.6 and 109.05.C.10.

Provide documentation showing payment to trucking firms and owner-operators and owner-operations status. When the trucking is subject to prevailing wage, submit payroll and equipment usage records according to 109.05.C.2 and 109.05.C.4.

9. Professional and Specialized Work. The following Work, when performed by a firm hired by the Contractor, is paid at the reasonable and fair market invoiced cost plus a 5 percent markup. The markup is limited to $10,000 for all the Work performed by the firm.

a. Surveying.
b. Engineering design.
c. Specialized Work that is not normally part of a County Contract and is not normally subject to prevailing wage.
d. Emergency Work to eliminate a hazardous condition.
e. Installation, periodic maintenance, and removal of traffic control devices under Item 614 performed by a traffic control service or rental company, provided the workers are not on the Project full-time. Maintenance of Traffic services performed by LEO.
f. Other professional or specialized Work not contemplated at the time of Bid.

Provide documentation showing payment for professional and specialized Work.

10. Payment for Force Account Work.

Submit an analysis of estimated cost prepared in accordance with 109.05C for work that will be performed on a force account basis. Attach an original affidavit to the analysis stating:

"Labor rates shown are the actual rates paid for labor, unit prices for materials and rates for owned and rented equipment have been estimated on the basis they are not in excess of those charged in the area in which the work will be performed."

The Engineer will process an Estimated Cost of Force Account (ECFA) if the amount of the force account work is likely to be greater than $100,000 and is expected to take more than two weeks to complete. The Engineer will process an Actual Cost of Force Account (ACFA) to make any necessary adjustment between the ECFA and the final itemized costs for the force account work.

For force account work estimated to be less than $100,000 and anticipated to require less than two weeks to perform, the Engineer will process an Actual Cost of Force Account (ACFA) at the conclusion of the work.

Submit biweekly itemized statement of costs prepared from the Daily Force Account Records to the Engineer as the work is being performed. The Engineer will process estimates as the force account work is performed. Payment will only be made upon receipt of the Contractor's itemized statement of costs.

Upon conclusion of the work performed by an ECFA or work performed by an ACFA submit an itemized statement of the actual costs prepared from the Daily Force Account Record.

Attach an original affidavit to the hard copy stating:

"The name, classification, total hours worked and rates paid each person listed on the Summary of Actual Cost are substantiated by actual records of persons employed on the force account work. All unit prices for materials and rates for owned and rented equipment listed on the Summary of Actual Costs are substantiated by actual records of materials and equipment actually used in performance of the force account work and the price of any owned equipment not previously agreed upon does not exceed prices charged for similar equipment in the area in which the work was performed."

Daily Force Account Records signed by both the County and Contractor will govern over other County and Contractor records subject to the following:

(a.) When the Contractor is subject to a Union Contract that requires a minimum number of paid hours, the compensation will be for the verified contract minimum hours.

(b.) Material quantity disagreements will be resolved by field measurements of the installed quantities or the Engineer's estimate of the amount of temporary or un-measurable material used. The Engineer may also review and consider the Contractor's material invoices and material certifications to make the final determination.

In the event the Contractor declines to sign the Daily Force Account Record, the County's records shall govern. Any resulting dispute must be pursued in accordance with 108.02.F.

The County will not make final payment for Work performed on a force account basis until the Contractor has furnished the Engineer with itemized statements of the cost of such force account Work and Cuyahoga County and the Contractor have entered into a Supplemental Agreement.

D. Delay Costs.

1. General. If the County agrees that it has caused a delay, the County will pay for the costs specified in 109.05.D as allowed by 108.06.D, unless these costs have been previously paid as listed in 109.05.B or 109.05.C. Such payment constitutes full compensation for any and all delay costs.

The County will make no payment for delays occurring during the period from December 1 to April 30 unless the Contractor's approved progress schedule depicts critical Work occurring throughout this period.

The County will make no payment for delay costs before the Contractor submits an itemized statement of those costs. Provide the content specified in 109.05.C.1, for the applicable items in this statement and as follows:

a. Proof of cost of Superintendent, or other project staff salaries, wages, and payroll taxes and insurance.
b. Proof of cost of office rent, utilities, land rent, and office supplies.
c. Proof of escalated cost for labor and material.
d. Proof of material storage costs.

2. Allowable Delay Costs.

a. Extended Labor. Compute labor costs during delays as specified in 109.05.C.2 for all non-salaried personnel remaining on the Project as required under collective bargaining agreements or for other Engineer-approved reasons.

b. Escalated Labor. To receive payment for escalated labor costs, demonstrate that the County-caused delay forced the Work to be performed during a period when labor costs were higher than planned at the time of Bid. Provide adequate support documentation for the costs, allowances, and benefits specified in 109.05.C.2. The County will pay wages and fringes with a 20 percent mark-up to cover administrative costs.

c. Idle Equipment or Equipment Demobilization. The County will pay the Contractor according to 109.05.C.4.c for idle equipment, other than small tools, that must remain on the Project during the delays. The County will pay the Contractor's transportation costs to remove and return equipment not required on the Project during the delays. No other equipment costs are recoverable as a result of delay.

d. Material Escalation or Material Storage. The County will pay the Contractor for increased material costs or material storage costs due to the delay. Obtain the Engineer's approval before storing materials due to a delay. Payment will be based upon the accepted quantity of work performed during the period for which escalated costs have been approved. The County will pay increased material costs with an 8 percent mark-up to cover administrative costs and any material waste inherent to the work.

e. Field Overhead. The County will pay any Contractor or subcontractor for field overhead costs which include the cost of supervision, field office and office supplies, and utilities for which payment is not provided for in 109.05.D.2.f, during a delay period provided all of the following criteria are met:

(1) The Contractor or subcontractor has incurred an excusable, compensable delay that delays the Work at least 10 Calendar Days beyond the original Completion Date. These days are cumulative throughout the project.
(2) The delay for which payment of field overhead is sought is only due to delays defined in 108.06.D.3 and 108.06.D.5 or for delays due to revised Work as specified in 104.02.B or 104.02.F that is <u>not</u> performed under 109.05.C Force Account.
The County will pay the salary and fringes plus a 5 percent markup for field personnel identified in Table 109.05-4.

Table 109.05-4

Original Contract Amount	Field Personnel
Up to $5,000,000	One Superintendent
$5,000,001 to $50,000,000	One Superintendent, One Assistant Superintendent or One Engineer, One Clerk
Over $50,000,000	One Superintendent, One Assistant Superintendent, One Engineer, One Clerk

f. Home Office Overhead. The County will pay the Contractor for home office overhead, unabsorbed home office overhead, extended home office overhead, and all other overhead costs for which payment is not provided for in 109.05.D.2.e, including overhead costs that would otherwise be calculated using the Eichleay formula or some other apportionment formula, provided all of the following criteria are met:

(1) The Contractor has incurred an excusable, compensable delay that delays the Work at least 10 Calendar Days beyond the original Completion Date. These days are cumulative throughout the project.

(2) The delay for which payment of home office overhead is sought is only due to delays defined in 108.06.D.3 and 108.06.D.5.

Any subcontractor that has approved C-92's for subcontracted work totaling $4,000,000 or more is eligible for reimbursement of home office overhead provided the criteria set forth in 109.05.D.2.f.(1) and 109.05.D.2.f.(2) are met.

Payment will be made for every eligible day beyond the original contract completion date at the rate determined by 109.05.D.2.f.i. Payment for eligible days occurring during an unanticipated construction period will be calculated in accordance with 109.05.D.2.f.ii. Payment for eligible days occurring during an unanticipated winter period will be calculated in accordance with 109.05.D.2.f.iii.

(i) Home Office Overhead Daily Rate.
Calculate the home office overhead daily rate using the following formula:

$$Daily\ HOOP = (A \times C)/B$$

Where:
A = original contract amount
B = contract duration in Calendar Days
C = value from Table 109.05-5

TABLE 109.05-5

Original Contract Amount	*C*
Up to $5,000,000	0.08
$5,000,001 to $25,000,000	0.06
Over $25,000,000	0.05

Daily HOOP = home office overhead daily rate

Contract duration term, B, includes every Calendar Day from the execution of the Contract, unless otherwise specified by the County, to the original Contract Completion Date.

When the Contractor requests home office overhead compensation for a subcontractor, use the above formula to calculate the subcontractor's Daily HOOP; however, in the subcontractor calculation, A is equal to the subcontractor's portion of the original contract amount as determined by the sum of all approved C-92's issued for the subcontracted work.

(ii) Home Office Overhead Payment for an Unanticipated Construction Period.
Calculate the home office overhead payment for an unanticipated construction period occurring between May 1 and November 30 using the following formula:

$$CP\ HOOP = Daily\ HOOP \times D$$

Where:
D = sum of all excusable, compensable delays in Calendar Days minus the sum of all delays due to 108.06.D.1 and 108.06.D.4 in Calendar Days
Daily HOOP = daily home office overhead rate
CP HOOP = home office overhead payment for an unanticipated construction period occurring between May 1 and November 30

The excusable, compensable delay term, D, is the additional, unanticipated extended period for work performed between May 1 and November 30 in Calendar Days.

(iii) Home Office Overhead Payment for an Unanticipated Winter Period.
Calculate the payment for home office overhead for an unanticipated winter period occurring between December 1 and April 30 using the following formula:

$$WP\ HOOP = Daily\ HOOP \times F \times D/E$$

Where:
D = sum of all excusable, compensable delays in Calendar Days minus the sum of all delays due to 108.06.D.1 and 108.06.D.4 in Calendar Days
E = sum of all excusable, compensable delays in Calendar Days plus the sum of all excusable, non-compensable delays in Calendar Days
F =151 for a non-leap year or 152 for a leap year
Daily HOOP = daily home office overhead rate
WP HOOP = home office overhead payment for an unanticipated winter period occurring between December 1 and April 30

Payment for Home Office Overhead for an unanticipated winter period will not be made when the value of the remaining work is 15% or less of the estimated final contract value.

(iv) Total Home Office Overhead Payment.
Calculate the total home office overhead payment using the following formula:

$$Total\ HOOP = CP\ HOOP + WP\ HOOP$$

Where:
CP HOOP = home office overhead payment for an unanticipated construction period occurring between May 1 and November 30
WP HOOP = home office overhead payment for an unanticipated winter period occurring between December 1 and April 30
Total HOOP = total home office overhead payment

E. Changes in Materials.

Changes in material specifications that result in increased cost to the Contractor are compensated by lump sum adjustment to the reference number. The allowed compensation is equal to the invoice supported material cost increase plus 15 percent markup for profit and overhead.

Material cost savings resulting from a specification change shall be credited to the project by a lump sum adjustment to the reference number plus a 15 percent markup if the originally specified material has not been ordered.

If the original material was ordered before the Contractor was informed of the change, the savings markup allowed is 2.5 percent in order to exclude profit on the original bid price and pay only for incurred overhead.

109.06 Directed Acceleration. The Engineer may order the Contractor to accelerate the Work to avoid delay costs or to complete the Project early. The Engineer and the Contractor will negotiate acceleration costs.

109.07 Inefficiency. Payment for efficiency losses is limited to 5 percent unless otherwise determined by the Engineer. The County will compensate for all such costs according to 109.05.

109.08 Unrecoverable Costs. The Contractor is not entitled to additional compensation for costs not specifically allowed or provided for in 109.05 including, but not limited to, the following:

A. Loss of anticipated profit.

B. Consequential damages, including loss of bonding capacity, loss of bidding opportunities, insolvency, and the effects of force account Work on other projects, or business interruption.

C. Indirect costs.

D. Attorney's fees, claim preparation expenses, and the costs of litigation.

E. Interest before certification of claim.

109.09 Estimates.

If satisfactory progress is being made, the Contractor will receive monthly payments equaling the Work and materials in place. The monthly payment is approximate, and all partial estimates and payments are subject to correction in the Final Estimate and payment. No monthly payments, as a rule, will be made for an amount less than $500.00. Payment for Work and materials shall not, in any way, prevent later rejection when defective Work or material is discovered, or constitute acceptance under 109.11 or 109.12. Any pay item deficient in material approval can be withheld for payment on an estimate.

Except for estimates generated during Project Finalization, the County will not pay an estimate until the Contractor certifies to the Engineer that the work for which payment is being made was performed in accordance with the contract. Certification will be made on forms provided by the County.

The County may pay estimates twice each month if the Engineer concludes the amount of work performed is sufficient.

No estimate or payment shall be construed as acceptance of defective Work or improper materials.

The County will not pay the adjusted final estimate until the Contractor remedies all defective Work and accepted Work damaged by the Contractor's operations.

On or about the first day of each month the Engineer will make an approximate estimate of the value of the Work completed and of materials delivered which will become a part of the Work. In accordance with sections

153.12 and 153.14 of the ORC, ninety-two percent (92%) of the estimate will be paid to the Contractor until the Work is fifty percent (50%) complete. After the Work is fifty percent (50%) completed, further completed Work under the contract shall be paid for at the rate of one hundred percent (100%). In accordance with section 5555.66 of the ORC, materials delivered but not incorporated in the finished Work may be paid for at not more than ninety percent (90%) of the value of the material until the material is incorporated in the finished Work. The Contractor shall furnish to the Engineer such detailed information as he/she may request to aid him/her in preparation of monthly estimates.

In accordance with section 153.13 of the ORC, from the date the contract is fifty percent (50%) complete, as evidenced by payments in the amount of at least fifty percent of the contract to the Contractor, except in the case of contracts the total cost of which is less than fifteen thousand dollars, all funds retained pursuant to sections 153.12 and 153.14, of the ORC for the faithful performance of Work shall be deposited in the escrow account designated in section 153.63 of the ORC. After the contract is fifty percent complete, no further funds shall be retained. When the Engineer determines that the major portion of the project is substantially completed and occupied, or in use, or otherwise accepted, and there exists no other reason to withhold retainage, the retained percentages held in connection with such portion shall be released from escrow and paid to the Contractor, withholding only that amount the Engineer determines necessary to assure completion.

Estimates may be allowed twice each month if in the judgment of the Engineer the amount of Work performed is sufficient to so warrant.

Should any defective Work or material, or acceptable Work that has been damaged by the Contractor's operations, be discovered previous to the final acceptance or should a reasonable doubt arise previous to the final acceptance as to the integrity of any part of the completed Work, the estimate and payment for such defective or questioned Work shall not be allowed until the defect has been remedied and cause for doubt removed.

The Engineer may withhold indefinitely payment of any or all estimates until the Contractor complies with any or all of the orders given by the Engineer in compliance with and by virtue of the terms of the Contract.

109.091 Acceptance and Final Payment.

The Engineer shall within 30 days after the completion of the construction by the contractor, and after he/she has satisfied himself/herself by test, examination or otherwise that the Work has been finally and fully completed in accordance with the plans and specifications, make a final estimate of the Work done under the contract, the value thereof and the balance due to the Contractor.

Cuyahoga County shall, in accordance with 153.14 ORC, pay the entire balance so found to be due within 30 days after such final estimate is made and certified. All prior estimates and payments shall be subject to correction in the final estimate and payment, but in the absence of error or manifest mistakes, it is agreed that all estimates certified by the Engineer, when approved by Cuyahoga County, shall be conclusive of the Work done and materials furnished.

Before payment is made on the final estimate the Contractor shall submit a signed and notarized affidavit, on the form prepared by the Engineer, which states all bills for labor, materials, and services rendered by others in connection with the contract have been paid in full and all claims and obligations arising in connection with the Work have been satisfactorily settled. Cuyahoga County may further request waivers of liens from each and every subcontractor or supplier for the Contractor.

Before payment is made on the final estimate the Contractor shall also submit the affidavit required by 108.10.

The date of approval of the final estimate by Cuyahoga County shall be the date of final acceptance for the Project.

109.10 Payment for Delivered Materials.

Partial payments may be made up to 90% of the delivered cost of approved materials to be incorporated in the Work, when delivered on the project or stored in acceptable storage places in the vicinity of the project.

Partial payments may be made up to 90% of the cost of approved materials to be incorporated in the Work when assigned to the Contractor, if the Engineer determines that it is not practical to deliver the material to the project site. This provision shall be applicable only to bulky materials that are durable in nature and represent a significant portion of the project cost, such as aggregates, steel, and precast concrete. Small warehouse items may not be included.

No partial payment will be made on living or perishable plant materials until planted.

All partial payments are subject to the provisions of 5555.66, ORC.

109.11 Partial Acceptance.

Upon completion of a portion of the Work, the Contractor may request acceptance of a completed portion of the Work.

A. An inspection may be performed on a completed portion of the project roadway section provided:

1. All safety items are in place including permanent pavement markings.
2. Traffic is in its final pattern.
3. A completed portion of the project constitutes a completed geographic section of the project or a direction of traffic on a divided highway.
4. Is in accordance with other contract provisions.

B. An inspection may be performed on a completed bridge provided:

1. All work on the bridge and approaches are complete, including all safety items and permanent pavement markings.
2. The Contractor will not return to the bridge for any work except as allowed in 4.
3. Traffic is in its final pattern.
4. Painting of structural steel is either completed or scheduled to be performed.
5. Is in accordance with other contract provisions.

The Engineer will grant written partial acceptance for that portion of the Work or reject the Contractor's request. Such written partial acceptance will designate what portion of the Work is accepted, the date of acceptance, and the warranty provisions started by the partial acceptance.

Partial acceptance will relieve the Contractor of maintenance responsibility for the designated portion of the Work. This does not relieve the Contractor of responsibility to correct defective Work or repair damage caused by the Contractor or waive any other remedy to which the County is entitled at law or in equity.

109.12 Final Acceptance and Termination of Contractor Responsibility.

A. Final Inspection. The County will perform a Final Inspection for the sole purpose of relieving the Contractor of maintenance responsibility for the Work.

The Final Inspection shall be a limited visual review of the Work and shall only serve as the County's verification that the Work appears substantially complete. Final Inspection does not waive any available rights or remedies of the County, nor divest the Contractor of any responsibility for compliance with the contract or liability for damages.

Notify the Engineer when the Project is complete and all of the Engineer's punch list items are complete. If the Engineer agrees the Project is complete, then within 10 business days the Engineer will inspect the Work and categorize it as one of the following:

1. Unacceptable or not complete.

2. Substantially complete with punch list items found by the Engineer.

3. Substantially complete.

If the Engineer finds the Work substantially complete or substantially complete with punch list items, then the Contractor's maintenance responsibilities end on the day of the Final Inspection, except for any maintenance related to unfinished punch list items. This does not relieve the Contractor of responsibility to correct defective Work or repair damage caused by the Contractor or waive any other remedy to which the County is entitled at law or in equity. The Engineer will issue a Final Inspection Report that will document the findings of the inspection and start any warranty period.

B. Punch List. The Engineer will issue to the Contractor a written punch list of work required as a condition of final acceptance. For project involving multiple public agencies, the Engineer will receive and compile punch lists from all agencies that have authority to provide one prior to issuing the County's punch list. The Engineer's punch list will stipulate a reasonable time to complete the required Work. Failure of the Contractor to complete the punch list items by the stipulated time will result in the assessment of fifty percent of the Liquidated Damages according to 108.07 for each Calendar Day for every day beyond the stipulated time the punch list work remains incomplete and beyond the revised Completion Date.

C. Finalization. The Contractor shall accept the final quantities as determined by the Engineer or provide a written notice indicating the reason for disagreement within 30 Calendar Days of receiving the Engineer's list of final quantities. The prescribed 30 Calendar Day period can be modified by mutual agreement of the Contractor and the Engineer. If no notice of disagreement is received, then the final payment will be based on the Engineer's list of final quantities.

Supply all documents necessary for Project finalization within 60 Calendar Days from the date that the Work is physically complete. These documents include:

1. Delinquent material certifications.

2. Delinquent certified payrolls or required revised payrolls.

3. Wage affidavit required by ORC Chapter 4115 on projects without any Federal funding.

4. Delinquent force account records.

5. If applicable, DBE or SBE affidavits.

6. Any other document required to complete finalization of the project.

Failure to submit these acceptably completed documents will result in an administrative fee of $100 per Calendar Day for every day that any of the required documents remain delinquent, starting 30 Calendar Days after receipt of written notification from the Engineer of a document deficiency.

D. Acceptance and Final Payment. Final payment is based on:

1. The agreed final quantities or as determined by the Engineer if agreement is not possible, no compensation for unauthorized Work is allowed.

2. Acceptance by the Engineer.

3. Receipt of acceptable finalization documents.

4. Contractor certification that the Work was performed in accordance with the contract.

E. Termination of Contractor's Responsibility. The contract will be considered complete when all Work has been completed, the final inspection has been made, the Work has been accepted and the amount certified in the final estimate has been approved in writing by Cuyahoga County. The Contractor will then be released from further obligations except that the Contractor and Surety will still be responsible under the provisions of ORC 153.56 with regards to any money due for labor or Work performed or materials furnished on the project for the time period stipulated in ORC 153.56. Completion of the Contract does not relieve the Contractor of any responsibilities to properly perform or correct the Work or to repair damage or waives any remedies to which the County is entitled at law or in equity.

SECTION 200

SPECIAL PROVISIONS

- **CUYAHOGA COUNTY'S SPECIAL LPA PROVISIONS**
- **ODOT'S LPA TEMPLATE – REQUIRED CONTRACT PROVISIONS**
- **BUY AMERICA CERTIFICATION**
- **ADDITIONAL INSURANCE COVERAGE REQUIRED**
- **STATE OF OHIO EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS AND BID CONDITIONS FOR OPWC-ASSISTED CONSTRUCTION PROJECTS**
- **STRUCTURE FOUNDATION EXPLORATION AND CONDITION ASSESSMENT REPORT**
- **ASBESTOS INSPECTION REPORT, INCLUDING OHIO ENVIRONMENTAL PROTECTION AGENCY NOTICE OF DEMOLITION AND RENOVATION**
- **DEPARTMENT OF THE ARMY PERMIT No. LRH-2021-00124-CUY NATIONWIDE PERMIT No. 3**
- **OHIO ENVIRONMENTAL PROTECTION AGENCY, DIVISION OF SURFACE WATER – NOTICE OF INTENT (NOI) FOR COVERAGE UNDER OHIO ENVIRONMENTAL PROTECTION AGENCY GENERAL NPDES PERMIT**
- **FLOODPLAIN DEVELOPMENT PERMIT – INDEPENDENCE**
- **FLOODPLAIN DEVELOPMENT PERMIT – VALLEY VIEW**
- **CITY OF CLEVELAND, DIVISION OF WATER**
    - **LETTER OF APPROVAL, INCLUDING FEES FOR PROPOSED WORK**
    - **STAMPED APPROVED PLANS**

CUYAHOGA COUNTY'S SPECIAL LPA PROVISIONS

CUYAHOGA COUNTY'S SPECIAL LPA PROVISIONS

GENERAL INFORMATION

This job is a federal aid funded (LPA) project administered by Cuyahoga County. **Except as revised herein, "ODOT's LPA Template – Required Contract Provisions" shall apply.**

Wherever the term "Local Public Agency (LPA)" appears in "ODOT's LPA Template – Required Contract Provisions", such term shall, for the purpose of this Contract, be considered and taken as meaning Cuyahoga County (the County).

The "Required Contract Provisions for Federal-Aid Construction Contracts" (contained in ODOT's LPA Template) are hereby incorporated by reference.

Wherever the term "State Highway Agency" "(SHA)" appears in the "Required Contract Provisions for Federal-Aid Construction Contracts" portion of "ODOT's LPA Template", such term shall, for the purpose of this Contract, be considered and taken as meaning the Cuyahoga County Department of Public Works.

REVISIONS TO ODOT'S LPA TEMPLATE – REQUIRED CONTRACT PROVISIONS

Replace Provision No. 1 with the following:

1. **ODOT'S 2019 CONSTRUCTION AND MATERIAL SPECIFICATIONS (C&MS) AND ITS SUPPLEMENTS**

   With the exception of Section 100 "General Provisions", ODOT's 2019 Construction and Material Specifications (C&MS) and its supplements are hereby incorporated by reference, in their entirety, as if rewritten herein. The Cuyahoga County Engineer 2019 General Provisions contained in Section 100 of the Cuyahoga County Engineer Specification Booklet shall apply. All references to the General Provisions (Section 100) of ODOT's C&MS that are cited in the itemized specifications (C&MS), supplemental specifications (including SS 800), proposal notes, plans or elsewhere in the contract documents shall, for the purpose of this Contract, be considered and taken as meaning the Cuyahoga County Engineer's General Provisions. The subsection numbers and topics used in the County's General Provisions correspond to those contained in the ODOT C&MS.

   Wherever there appears, in the Standard Specifications (ODOT Itemized C&MS), Supplemental Specifications or Proposal Notes, the term "The State", "Director of Transportation", "Department", "District Construction Engineer / District Construction Administrator (DCA)", "Engineer", or any other term designating any representative or employee of the State or its Department of Transportation, such term shall, for the purpose of this Contract, be considered and taken as meaning and designating the respective Officer or Employee of Cuyahoga County whose duty or function it is to deal with the subject matter in connection with which such term is used and specifically:

The State	- means Cuyahoga County.
Department	- means the Cuyahoga County Department of Public Works.
Director	- means the Cuyahoga County Director of Public Works, his/her Deputies, or any engineer designated as the Director's representative.
District Construction	- means the Area Construction Engineer, or the duly authorized agent

or

Engineer / District Construction Administrator (DCA) or Engineer	representative of the Cuyahoga County Director of Public Works, acting within the scope of his/her authority for the purposes of construction engineering and administration of the contract.
Laboratory	- means any laboratory designated by the County.

Replace the last two sentences of Provision No. 4, PREQUALIFICATION, with the following:

Although subcontractor disclosure is not required as part of the Bid, the subcontractor qualification requirements specified in Section 108.01 (Subletting of Contract) of the Cuyahoga County Engineer's General Provisions shall apply. For this project, the "prime" contractor must perform no less than 50 percent of the total original contract price.

Be Advised that Provision No. 5, AS PER PLAN DESIGNATION is in effect for this Project.

DAMAGE CLAIMS AND LIABILITY INSURANCE

In addition to the requirements of Section 107.12 of the Cuyahoga County Engineer's General Provisions, the Contractor shall protect and indemnify the Ohio Department of Transportation from all claims and liability resulting from negligence or willful violations of the Contractor.

RECORD RETENTION

As the County, Ohio Department of Transportation (ODOT) or the United States government may legitimately request from time to time, the Contractor agrees to make available for inspection and/or reproduction by the County, ODOT or the United States government, all records, books, and documents of every kind and description that relate to this Contract.

DATA, PATENTS AND COPYRIGHTS: PUBLIC USE

Any designs, specifications, processes, devices or other intellectual properties specifically devised for the Contract by the Contractor/sub-contractor(s) shall become the property of the County, and that when requested, such designs, specifications, processes, devices or other intellectual properties shall become available to the Ohio Department of Transportation (ODOT) and the Federal Highway Administration (FHWA) with an unrestricted right to reproduce, distribute, modify, maintain, and use. The Contractor(s) shall not seek or obtain copyrights, patents, or other forms of proprietary protection for such designs, specifications, processes, devices or other intellectual properties, and in providing them to the Contract shall relinquish any such protections should they exist.

The Contractor(s) shall not utilize any copyrighted, patented or similarly protected design, specification, process, device or other intellectual property unless the Contractor(s) have provided for such use by suitable legal agreement with the owner of such copyright, patent, or similar protection. Contractor(s) making use of such protected items for the Contract shall indemnify and save harmless the County and any affected third party from any and all claims of infringement on such protections, including any costs, expenses, and damages which it may be obliged to pay by reason of infringement, at any time during the prosecution or after the completion of work on the Contract.

CUYAHOGA COUNTY'S SPECIAL LPA PROVISIONS

ODOT AS OBLIGEE ON BOND

In addition to the County, ODOT shall be named as an obligee in the Bidder's performance and payment bond as per "ODOT's LPA Template – Required Contract Provisions", Provision No. 28.

DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENT

DBE PARTICIPATION GOALS (SUBCONTRACTS, MATERIALS, SUPPLIES) HAVE BEEN SET ON THIS PROJECT FOR THOSE CERTIFIED AS DBE'S PURSUANT TO TITLE 23, U.S.C. SECTION 140 (C) AND 49 CFR, PART 26, AND WHERE APPLICABLE QUALIFIED TO BID WITH ODOT UNDER CHAPTER 5525 OF THE ORC.

The DBE Goal for this Project (PID No. 91563) is XX %.

ODOT'S LPA TEMPLATE – REQUIRED CONTRACT PROVISIONS

ODOT's LPA Template (ODOT Spec Book and LPA Spec Book)
Required Contract Provisions.

1. ODOT'S 2019 CONSTRUCTION AND MATERIAL SPECIFICATIONS (C&MS) AND ITS SUPPLEMENTS

With the exception of Section 100 "General Provisions" included in the matrix below, ODOT's Construction and Material Specifications (CM&S) and its supplements are hereby incorporated by reference, in their entirety, as if rewritten herein. **The incorporation of this document by reference does not interfere with the order of precedence set forth in Section 105.04 of the CMS Manual.**

In accordance with the Locally Administrated Transportation Projects Manual of Procedures (LATPM), when bidding this project, the Contractor should replace the terms "the Department", "the Engineer", "the DCE" and "the DCA" with the term "the Local Public Agency (LPA)." Furthermore, nothing in this document is intended to alter the LPA's adherence to Ohio Revised Code, local ordinance or other applicable requirements which are properly established.

Excluded 2019 Specifications			
Section102.01	Section 103.01	Section 105.19	
Section 102.03	Section 103.02	Section 107.04	
Section 102.06	Section 103.04	Section 107.13	
Section 102.09	Section 103.05	Section 108.01	
Section 102.10	Section 103.06	Section 108.02(B)	
Section 102.11	Section 103.07	Section 108.02(E)	
Section 102.13	Section 104.02(A)	Section 108.02(G)	
Section 102.14	Section 105.05	Section 108.08	
Section 102.17			

2. STEEL AND IRON PRODUCTS MADE IN THE UNITED STATES

Furnish steel and iron products that are made in the United States according to the applicable provisions of Federal regulations stated in 23 CFR 635.410 and State of Ohio laws, and ORC 153.011 and 5525.21. "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States. Both the State and Federal requirements contained in (A.) and (B.) of this section apply to this contract.

A. Federal Requirements. All steel or iron products incorporated permanently into the Work must be made of steel or iron produced in the United States and all subsequent manufacturing must be performed in the United States. Manufacturing is any process that modifies the chemical content; physical shape or size; or final finish of a product. Manufacturing begins with the initial melting and mixing and continues through the bending and coating stages. If a domestic product is taken out of the United States for any process, it becomes a foreign source material.

B. State Requirements. All steel products used in the Work for load-bearing structural purposes must be made from steel produced in the United States. State requirements do not apply to iron.

C. Exceptions. ODOT may grant specific written permission to use foreign steel or iron products in bridge construction and foreign iron products in any type of construction. ODOT may grant such exceptions under either of the following conditions:

1. The cost of products to be used does not exceed 0.1 percent of the total Contract cost, or $2,500, whichever is greater. The cost is the value of the product as delivered to the project.

2. The specified products are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet the requirements of the Contract Documents. ODOT may require the Contractor to obtain letters from three different suppliers documenting the unavailability of a product from a domestic source, if the shortage is not previously established.

D. Proof of Domestic Origin. Furnish documentation to the Engineer showing the domestic origin of all steel and iron products covered by this section, before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

3. CERTIFICATION AGAINST DEBARMENT AND SUSPENSION

The bidder hereby certifies by signing this proposal that, except as noted below, under penalty of perjury and under other such penalties as the laws of this state and the United States of America provide, that the company or any person associated there with in the capacity of owner, partner, director, officer, principal investigator, project director, manager, auditor, or any position involving the administration of federal funds is **not** currently under suspension, debarment, voluntary exclusion or determination of ineligibility by any federal agency; that the company or any person associated therewith in the capacity of owner, partner, director, officer, principal investigator, project director, manager, auditor, or any position involving the administration of federal funds has **not** been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past three (3) years; that the company or any person associated therewith in the capacity of owner, partner, director, manager, auditor, or any position involving the administration of federal funds does **not** have a proposed debarment pending; that the company or any person associated there with in the capacity of owner, partner, director, officer, principal investigator has **not** been indicted, convicted, or had a civil judgment rendered against the company, or themselves by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three (3) years.

If there are exceptions to any of the above clauses, please include a statement with the bid package detailing these exceptions.

Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. For any exception noted, indicate below to whom it applies, initiating agency and dates of action. Providing false information may result in criminal prosecution or administrative sanctions. Execution of this proposal on the signature portion thereof shall constitute also signature of this certification as permitted by Title 28 United States Code, Section 1746.

4. PREQUALIFICATION

Only pre-qualified contractors are eligible to submit bids for this PROJECT. Pre-qualification status must be in force **at the time of bid, at the time of award, and through the life of the construction contract.** For work types that ODOT does not pre-qualify, the LPA must still select a qualified contractor. Subcontractors are not subject to the pre-qualification requirement. The “prime” contractor must perform no less than 30 percent of the total original contract price.

5. PN033 - 4/18/2008- AS PER PLAN DESIGNATION

(Not required by FHWA, but strongly suggested if As Per Plan is used by the LPA)
For the last several years the "As Per Plan" designation has been added to some item descriptions in the proposal to assist the Contractors to easily identify standard items that have been altered by plan notes.

The "As Per Plan" designation has proven to be a very useful tool for the Contractors. However, its use was never intended to relieve the Contractors of their responsibility to read, bid and construct all items in accordance with all governing plan notes. Therefore, the absence of an "As Per Plan" designation on some item descriptions in the proposal for which there are clear and controlling plan notes does not relieve the Contractors of the responsibility to read, bid and construct those particular items in accordance with the governing plan notes.

Be advised that the item descriptions in the bidding proposal must be read or interpreted with the governing plan notes and the Construction and Material Specification Manual. A claim based upon an "order of precedence" basis will be denied. In the event that a conflict, either real or perceived, exists between the item description and the governing plan note, the Contractors are to request clarification through the pre-bid process.

6. FEDERALLY REQUIRED EEO CERTIFICATION FORM

The bidder hereby certifies that he **has** ...., **has not** ...., participated in a previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, and that he **has** ...., **has not** ...., filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements. ***The Bidder must circle the appropriate "has or has not" above.***

7. PN 017 - 10/15/2004 - FEDERALLY REQUIRED EEO CERTIFICATION CLAUSE

The Federally Required EEO Certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7 (b) (1)) and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontractors which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of $10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7 (b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

8. PN 026 - 10/15/2004 - CERTIFICATION OF NONSEGREGATED FACILITIES

(a) Certification of Non-segregated Facilities, as required by the May 9, 1967, Order of the Secretary of Labor (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities (for a Federal-aid highway construction contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause).

(b) Bidders are cautioned as follows: By signing this bid, the bidder has agreed to the provisions of the "Certification of Non-segregated Facilities" in this proposal. This certification provides that the bidder does not maintain or provide for his employees' facilities which are segregated on a basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that the bidder will not maintain such segregated facilities.

(c) Bidders receiving Federal-aid highway construction contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause, will be required to provide for the forwarding of the following notice to prospective subcontractors for construction contracts and material suppliers where the subcontracts or material supply agreements exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

"Notice to Prospective Subcontractors and Material Suppliers of Requirement for Certification of Non-segregated Facilities" -

(a) A Certification of Non-segregated Facilities as required by the May 9, 1967, Order of the Secretary of Labor (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, which is included in the proposal, or attached hereto, must be submitted by each subcontractor and material supplier prior to the award of the subcontract or consummation of a material supply agreement if such subcontract or agreement exceeds $10,000 and is not exempt from the provisions of the Equal Opportunity clause.

(b) Subcontractors and material suppliers are cautioned as follows: By signing the subcontract or entering into a material supply agreement, the subcontractor or material supplier will be deemed to have signed and agreed to the provisions of the "Certification of Non-segregated Facilities" in the subcontract or material supply agreement. This certification provides that the subcontractor or material supplier does not maintain or provide for his employees' facilities which are segregated on the basis of race, creed, color, or national origin, whether such facilities are segregated by directive or on a de facto basis. The certification also provides that the subcontractor or material supplier will not maintain such segregated facilities.

(c) Subcontractors or material suppliers receiving subcontract awards or material supply agreements exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause will be required to provide for the forwarding of this notice to prospective subcontractors for construction contracts and material suppliers where the subcontracts or material supply agreements exceed $10,000 and are not exempt from the provisions of the Equal Opportunity clause.

9. PN 003 - 10/15/2004 - TITLE VI RELATED STATUTES NON-DISCRIMINATION STATEMENT

The LPA, under Title VI of the Civil Rights Act and related statutes, ensures that no person in the LPA, shall on the grounds of race, color, national origin, sex, disability or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity it administers.

10. CERTIFICATION OF COMPLIANCE WITH AFFIRMATIVE ACTION PROGRAMS

In accordance with Ohio Administrative Code §9.47, before any Contract is awarded, the LPA will require the Bidder to furnish a valid Certificate of Compliance with Affirmative Action Programs, issued by the State EEO Coordinator dated prior to the date fixed for the opening of bids.

11. PN 020 – 11/21/2011 - NOTICE OF REQUIREMENT OF AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY

The Bidder's attention is called to the affirmative action obligations required by the specifications set forth in 23 CFR Part 230, 41 CFR Part 60, Executive Order 11246, Section 503, and the affirmative action provisions of Vietnam Era Veterans' Readjustment Assistance Act (VEVRAA) of 1974.

Utilization goals applicable to the project, expressed in percentages, for minority and female participation for each construction craft can be found on ODOT's website at **http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/Pages/default.aspx.** These goals are based on 2000 census data and represent the area, per craft, minority and female availability pool.

Minority and female utilization obligations by craft per county (applicable to project):
http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/Construction/CountyAvailability-ByTrade.pdf

Statewide utilization obligations by craft (applicable to the Contractor's statewide workforce):
http://www.dot.state.oh.us/Divisions/ContractAdmin/Contracts/Construction/StatewideAverages-ByTrade.pdf

Effective 11/21/2011 the New Hire Definition will be as follows:
An individual who has a break in service (not on an employer's payroll) for a period of 12 months or longer and the person affected is not a salaried employee but belongs to a union craft. Individuals compensated for training or incidental work which does not cause a break in unemployment compensation, i.e., paid by voucher check or petty cash, are considered new hires if the individual's break in service is 12 months or longer.

The time frame for a new hire shall be associated with the first project worked for that contractor regardless of whether it is public or private. When reporting new hires, the contractor shall identify that employee as a new hire on that specific project only. Subsequent work, barring a break in service of 12 months or more, would not qualify the employee as a new hire for that contractor.

The Contractor's compliance shall be based on the implementation of affirmative action obligations required by the specifications set forth in 23 CFR Part 230, and its good faith efforts to meet these obligations. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and females on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the affirmative action obligations shall be a violation of the contract and regulations in 23 CFR Part 230. The good faith efforts put forth by the contractor will be measured against the total work hours performed. Under FHWA, ODOT is the authority tasked with ensuring that the contractor adheres to the aforementioned regulations. In addition to complying with the Required Contract Provisions as outlined in the attached subcontract agreement the Contractor shall provide immediate written notification to the ODOT and the Prime Contractor when referral practices of the union or unions with which the Contractor has a collective bargaining agreement impede the company's efforts to meet its equal opportunity obligations.

The Office of Federal Contract Compliance Programs (OFCCP) administers and enforces equal employment opportunity laws that apply to Federal government contractors and subcontractors supplying goods and services, including construction, to the Federal Government under 41 CFR Part 60, Executive Order 11246, Section 503, and the affirmative action provisions of VEVRAA. The OFCCP monitors compliance with these laws primarily through compliance evaluations, during which a compliance officer examines the contractor's affirmative action efforts and employment practices. Under Executive Order 11246, the OFCCP may perform contract compliance reviews on contractors involved with federally funded ODOT projects.

Requirements for affirmative action obligations governing OFCCP contract compliance reviews are those listed in the Construction Contractors Technical Assistance Guide.
https://www.dol.gov/sites/dolgov/files/OFCCP/Construction/508_cctag_12032020.pdf

The Department of Administrative Services (DAS), Equal Opportunity Division, is responsible for ensuring state contractors implement and adhere to the State of Ohio's affirmative action program pursuant to Ohio Administrative Code (OAC) 123:2-3-02. Specifically, this unit's responsibilities include the issuance of certificates of compliance under ORC 9.47 and 153.08, conducting project site visits and compliance reviews (desk audits) to ensure contractors utilize minorities and women in the construction trades, as well as maintaining a working environment free of discrimination, harassment and intimidation. The DAS may perform contract compliance reviews on contractors involved with state funded ODOT projects. Requirements for affirmative action obligations governing DAS contract compliance reviews are those listed in the O.A.C. for the Metropolitan Statistical Area in which a project is located. http://das.ohio.gov/Divisions/EqualOpportunity/ConstructionCompliance.aspx

All prime and subcontractors regardless on the number of employees or the state contract amount are required to submit monthly utilization reports (Input Form 29) to Ohio Department of Administrative Services covering the contractor's total workforce within the state of Ohio. The reports must be filed electronically by the 10th of each month, beginning with the contract award and continuing until the contractor or subcontractor completes performance of the state contract. http://das.ohio.gov/Divisions/EqualOpportunity/InputForm29.aspx

The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs, 200 N. High Street, Room 409, Columbus, Ohio 43215, within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract, estimated starting and completion dates of the subcontract and the geographical area in which the subcontract is to be performed.

12. PN 029 - 10/15/2004 - ON-THE JOB TRAINING (OJT) PILOT PROGRAM

The requirements of this Training Special Provision supersede subparagraph 7b of the Special Provision entitled Special Employment Opportunity Responsibilities and implements 23 U.S.C. 140(a).

The following must be included as part of the Contractor's equal employment opportunity affirmative action training program:

The Contractor must provide on-the-job training aimed at developing full journey persons in the type or job classification in which they work.

The contractor is not required to have a specific number of trainees assigned to this project. The number of trainees will be distributed among the work classifications on the basis of the Contractor's needs and the availability of the journey persons in the various classifications. The Contractor will be credited for each trainee employed by him or her who is currently enrolled or becomes enrolled in an approved program.

Training and upgrading of minorities and women toward journey person status is a primary objective of this Training Special Provision. Accordingly, the Contractor must make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and will not be used, to discriminate against any applicant for training, regardless of whether the applicant is a member of a minority group or not.

No employee will be employed as a trainee in any classification in which he or she has successfully completed a training course leading to journey person status or in which he or she has been employed as a journey person. The Contractor must satisfy this requirement by including appropriate questions in the employee's application or by other suitable means. Regardless of the method used, the Contractor's records must document the findings in each case.

The minimum length and type of training for each classification will be established in the training program selected by the Contractor.

No payment by the LPA will be made to the Contractor for providing this training. However, if the Contractor fails to provide adequate training and cannot show good faith efforts on its part to provide adequate training, it will be subject to a formal compliance review to determine the Contractor's efforts in meeting the EEO laws and regulations.

The Contractor must provide the following reports:

1. CR1 Report Click Here for copy of CR1 Report

   A. To be completed on each trainee
   B. To be filled out at the start of training and finish of training or at the end of the year, whichever comes first
   C. To be submitted to the ODOT District in which the Contractor's home office is located.

2. Tracking will be on an annual basis. The Contractor must submit the subsequent CR1 to the ODOT District in which the Contractors home office is located.

The prime or subcontractor conducting the training must be involved in at least one Federal project per calendar year in order to get FHWA training credit. Participation in the OJT Program is not project or contract specific.

All Contractors are encouraged to participate in the OJT program. Such a program will be considered when examining the contractor's Good Faith Efforts toward meeting its contractual affirmative action obligations.

All Contractors shall submit their own Training Program or Apprenticeship Certificate, for approval, to the ODOT District in which the company's home office is located.

All OJT Trainees must have the appropriate certification. Apprenticeship Certificates can be obtained from the State of Ohio, Bureau of Apprenticeship and Training. The union apprenticeship agreement is not acceptable verification of an apprentice's enrollment in a union sponsored training program. A copy of the Apprenticeship Certificate along with a statement indicating the number of months/years the employee has been in the apprenticeship program must be submitted to the ODOT EEO Coordinator in the company's home district and to the prevailing wage coordinator in the district responsible for the project within 90 days of the apprentice beginning work on the project.

13. PN 059 - 10/15/2004 - WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:
   * An existing published wage determination
   * A survey underlying a wage determination
   * A Wage and Hour Division letter setting forth a position on a wage determination matter
   * A conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response for this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determination
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (see 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U. S Department of Labor
200 Constitution Avenue, N.W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requester considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

14. PN 061 –10/22/2012- WAGE SCALE ON ALL FEDERAL-AID PROJECTS

The wage rates for this project were determined by the Secretary of Labor in accordance with Federal-Aid requirements. LPA must formally incorporate into contract documents.

Contractors shall use only the classifications and wage rates set forth in the United States Department of Labor (USDOL) wage decision found at website noted below on payrolls submitted to the District Office. Additionally, please note that the wage modification in effect at the time of the project sale date, shall be used by all contractors.

This USDOL wage decision may be viewed, by accessing the United States Department of Labor (USDOL) website at:

beta.SAM.gov

This contract requires the payment of the total of the basic hourly rates plus the fringe benefits payments for each classification in accordance with the following regulations which by reference are made part of this contract:

1) The U.S. Department of Labor Regulations, Title 29, Subtitle A, Part 5, Sections 5.5, 5.31, and 5.32, most recent revision at contract execution.

2) Form FHWA-1273 (most recent revision at contract execution) Part IV. Payment of Predetermined Minimum Wage and Part V. Statements and Payrolls.

The failure to pay prevailing wages to all laborers and mechanics employed on this project, shall be considered a breach of contract. Such a failure may result in the termination of the contract and debarment.

The Contractor and all subcontractors shall pay all wages and fringe benefits by company check. All payroll records and canceled pay checks shall be maintained for at least three years after final acceptance as defined in Section 109.12 of the Ohio Department of Transportation Construction and Materials Specifications. The Contractor's and all subcontractor's payroll records and canceled pay checks shall be made available for inspection by the Department and the U.S. Department of Labor, upon request, anytime during the life of the contract, and for three years thereafter by the U.S. Department of Labor. Additionally, the Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job.

The wage and fringe rates determined for this project shall be posted by the Contractor in a prominent and accessible place on the project, field office, or equipment yard where they can be easily read by the workers.

The Contractor and all subcontractors shall submit to the District Construction Office, certified payrolls each week beginning three weeks after the start of work. These payrolls shall be on a Form A-87 or equivalent and shall show the following:

1) Employee name, address, classification, and hours worked.
2) The basic hourly and overtime rate paid, total pay, and the manner in which fringe benefit payments have been irrevocably made.
3) The project number and pay week dates.
4) Original signature of a company officer on the certification statement.

Click for Form A-87 then scroll down page to Pre-Uniform Guidance and click "Timecard Example A-87 Compliant".

Additionally, a copy of the "Apprentice Certification" obtained from the Ohio State Apprenticeship Council, must accompany all certified payrolls submitted for all apprentices working on this project.

Please be aware that it is ultimately the responsibility of the Contractor to ensure that all laws relating to prevailing wages in the USDOL Regulations, Title 29, parts 1 and 5, are strictly adhered to by all subcontractors on the project.

If the Contractor or any subcontractor fails to comply with any of the provisions contained in this proposal note, the Department may terminate the contract, debar the Contractor or Subcontractor and/or withhold or suspend pay estimates after written notice and a reasonable opportunity to comply has been provided.

The applicable wage and fringe rates for this project are to be incorporated in their entirety as an attachment to the executed contract.

15. LIMITATION ON USE OF CONTRACT FUNDS FOR LOBBYING

1. The prospective bidder certifies, by signing and submitting this bid proposal, to the best of his or her knowledge and belief, that:

   (a.) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

   (b.) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. This certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective bidder also agrees by submitting his or her bid proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such subrecipients shall certify and disclose accordingly.

16. PN 045 - 10/15/2004 - NON -COLLUSION AFFIDAVIT

In accordance with Title 23 United States Code, Section 112 and Ohio Revised Code, Chapter 1331 et. seq: and Sections 2921.11 and 2921.13, the bidder hereby states, under penalty of perjury and under other such penalties as the law provides, that he or his agents or employees have not entered either directly or indirectly into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal. Execution of this proposal on the signature portion thereof shall constitute also signature of this Non-Collusion Affidavit as permitted by title 28 United States Code, Section 1746.

REPORTING BID RIGGING

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the “hotline” to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially, and caller anonymity will be respected.

17. PN 014 - 10/15/2004 - DRUG-FREE WORKPLACE

The prime contractor agrees to comply with all applicable state and federal laws regarding drug-free workplace. The prime contractor shall make a good faith effort to ensure that all its employees, while working on this project, will not purchase, transfer, use or possess illegal drugs or alcohol or abuse prescription drugs in any way.

The prime contractor shall also require that this contractual obligation be placed in all subcontractor and materialman contracts that it enters into and further requires that all subcontractors and materialmen place the same contractual obligations in each of their lower tier contracts.

18. PN 034 - 05/25/2011 – DRUG FREE SAFETY PROGRAM

During the life of this project, the Contractor and all its Subcontractors, that provide labor on the Project site, must be enrolled in and remain in good standing in the Ohio Bureau of Worker's Compensation ("OBWC") Drug-Free Safety Program ("DFSP") or a comparable program approved by the OBWC.

In addition to being enrolled in and in good standing in an OBWC-approved DFSP or a comparable Drug Free Workplace Program ("DFWP") approved by the OBWC, the LPA requires each Contractor and Subcontractor that provides labor, to subject its employees who perform labor on the project site to random drug testing of 5 percent of its employees. The random drug testing percentage must also include the on-site supervisors of the Contractors and Subcontractors. Upon request, the Contractor and Subcontractor shall provide evidence of required testing to the LPA.

Each Subcontractor shall require all lower-tier Subcontractors that provides labor on the project site with whom the Subcontractor is in contract for the Work to be enrolled in and be in good standing in the OBWC DFSP or an OBWC-approved DFWP prior to a lower-tier Subcontractor providing labor at the Site.

The LPA will declare a bid non-responsive and ineligible for award if the Contractor is not enrolled and in good standing in the Ohio Bureau of Workers' Compensation's DFSP Discount Program or a similar program approved by the Bureau of Workers' Compensation within 8 days of the bid opening. Furthermore, the LPA will deny all requests to sublet when the subcontractor does not comply with the provisions of this proposal note.

Failure of the Contractor to require a Subcontractor to be enrolled in and be in good standing in the OBWC DFSP or an OBWC-approved DFWP prior to the time that the Subcontractor provides labor at the Site, shall result in the Contractor being found in breach of the Contract and that breach shall be used in the responsibility analysis of that Contractor or the Subcontractor who was not enrolled in a program for future contracts with the State for five years after the date of the breach.

19. OHIO WORKERS'COMPENSATION COVERAGE

The Contractor must secure and maintain valid Ohio workers' compensation coverage until the project has been finally accepted by the Ohio Department of Transportation. A certificate of coverage evidencing valid workers' compensation coverage must be submitted to the LPA before the contract will be executed by the LPA.

The Contractor must immediately notify the LPA, in writing, if it or any subcontractor fails or refuses to renew their workers' compensation coverage. Furthermore, the Contractor must notify the LPA, in writing, if it's or any of its subcontractor's workers' compensation policies are canceled, terminated or lapse.

The failure to maintain valid workers' compensation coverage shall be considered a breach of contract which may result in the Contractor or subcontractor being removed from the project, withholding of pay estimates and/or termination of the contract.

20. PN 038 - 10/15/2004 - UNRESOLVED FINDING FOR RECOVERY

The Contractor affirmatively represents to the LPA that it is not subject to a finding for recovery under Ohio Revised Code §9.24, or that it has taken the appropriate remedial steps required under §9.24 or otherwise qualifies under that section. The Contractor agrees that if this representation is deemed to be false, the contract shall be void ab initio as between the parties to this contract, and any funds paid by the state hereunder shall be immediately repaid to the LPA, or an action for recovery may be immediately commenced by the LPA and/or for recovery of said funds.

21. PN 039 - 10/15/2004 - ASSIGNMENT OF ANTITRUST CLAIMS IN STATE CONTRACT LANGUAGE

The Contractor should recognize that in actual economic practice, overcharges resulting from antitrust violations are usually borne by ODOT and/or the LPA. As consideration for the Award of the Contract and intent to be legally bound, the Contractor acting herein by and through the person signing this contract on behalf of the Contractor as a duly authorized agent, hereby assigns, sells, conveys, and transfers to ODOT and/or the LPA any and all right, title and interest to any and all claims and causes of action the Contractor now has or hereafter requires under state or federal antitrust laws provided that the claims or causes of action related to the goods or services that are the subject to the contract. In addition, the Contractor warrants and represents that it will require any and all of its subcontractors and first tier suppliers to assign any and all federal and state antitrust claims and causes of action to ODOT and/or the LPA. The provisions of this article shall become effective at the time the LPA executes this contract without further acknowledgment by any of the parties.

All contracting entities shall assign their rights and responsibilities to ODOT and/or the LPA for all antitrust claims and causes of action regarding subcontractors.

22. PN 024 – 04/21/2006 – US ARMY CORPS OF ENGINEERS AND OHIO ENVIRONMENTAL PROTECTION AGENCY PERMITS

The above referenced permits are incorporated and made a part of this contract as special provisions incorporated herein. Therefore, in the event that the Contractor or its agents refuse or fail to adhere to the requirements of the US Army Corps of Engineers 404 Permit, and/or the Ohio Environmental Protection Agency's 401 Water Quality Certification and an assessment or fine, is made or levied against the Ohio Department of Transportation, the Contractor shall reimburse the Department within thirty (30) calendar days of the notice of assessment or fine or the Department may withhold the amount of the fine from the Contractor's next pay estimate. All money collected or withheld from the Contractor shall be delivered to the permitting agencies issuing the assessment or fine.

These fines are not to be construed as a penalty but are liquidated damages to recover costs assessed against the Department due to the Contractor's refusal or failure to comply with the permits.

23. PN 007 – 1/31/2021- DBE TRUCKING

The Code of Federal Regulations Title 49, Section 26.55(d)(4)(5)(6) governs trucking operations.

The Disadvantaged Business Enterprise (DBE) trucking firm must be able to quote and negotiate its own prices. The DBE trucking firm must also provide a quote for each project that the firm is to be utilized toward the project DBE goal.

The DBE will be responsible for the management and supervision of their trucking operation on each contract. A DBE is not performing a CUF if the contract exists for the purpose of creating the appearance of DBE participation.

The DBE must own and operate at least one fully licensed, insured, and operational truck used on the contract.

The DBE receives credit for the total value of the transportation services the DBE provides on the contract using trucks the DBE owns, insures, and operates using drivers it employs (not 1099/independent contractors).

The DBE may lease trucks on a long-term basis (a year or more) and receive full DBE credit as long as employees of the DBE operate the truck.

A lease must indicate that the DBE has exclusive use of and control over the truck, including responsibility of maintenance and insurance. This does not preclude the leased truck from working for others during the term of the lease with the DBEs consent, as long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the DBEs name and identification number as well.

The DBE must carry a copy of the lease agreement in the leased truck when working onsite.
Truck Monitoring:

Credit for expenditures with DBEs for materials or supplies toward the DBE goal is described as follows:

1. A DBE firm may be a regular dealer in bulk items such as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business if the firm both owns and operates distribution equipment for the products. Any supplementing of a regular dealer's own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis.

2. When the materials or supplies are obtained from a DBE MSV (Materials and Supplies Vendor) manufacturer the prime contractor may receive credit for 100 percent of the cost of the materials or supplies toward the DBE goal. For purposes of this section, a manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.

3. When the materials or supplies are purchased from a DBE MSV regular dealer or supplier the prime contractor may receive credit for up to 60 percent of the cost of the materials or supplies toward the DBE goal. For purposes of this section, a regular dealer or supplier is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

In the past, 60% of the cost of materials and supplies purchased from a DBE MSV (100% from a DBE MSV manufacturer) would usually be counted toward DBE goals. Effective September 1, 2018:

- Prime contractors must obtain information about the method of procurement for each item to be procured from a DBE MSV. The DBE Affirmation Form has been modified to accommodate this information.

- To be eligible to receive 100% credit toward DBE goals for a materials and supplies subcontract:
  - The DBE MSV must be certified with the correct (manufacturer) NAICS code for
  - the item
  - The DBE MSV must be certified with the correct descriptor for the item
  - The role the DBE MSV will play on the specific procurement in question must be
  - consistent with the manufacture of the item, as indicated by the information
    - provided by the DBE MSV

o To be eligible to receive 60% credit toward DBE goals for a materials and supplies subcontract:

- The DBE MSV must be certified with the correct (wholesale or retail) NAICS code for the item
- The DBE MSV must be certified with the correct descriptor for the item
- The role the DBE MSV will play on the specific procurement in question must be consistent with the regular sale or lease of the item, as indicated by the information provided by the DBE MSV
- The item must not be drop-shipped

o The above scenario applies to both bulk items (petroleum products, steel, cement, gravel, stone, asphalt, and others that ODOT may consider to be bulk items) and non-bulk items. For bulk items, there is an additional scenario whereby a contract with a DBE MSV could receive 60% credit. To be eligible to receive 60% credit toward DBE goals for a bulk item materials and supplies subcontract:

- The DBE MSV must be certified with the correct (wholesale or retail and
  - trucking) NAICS codes for the item
- The DBE MSV must be certified with the correct descriptor for the item
- The role the DBE MSV will play on the specific procurement in question must be
  - consistent with the regular sale or lease of the item, as indicated by the
  - information provided by the DBE MSV
- The DBE MSV must deliver the bulk item from a non-DBE vendor to the prime contractor using distribution equipment that it both owns (or for which it has a long-term (1 year or more) lease) and operates with its regular (not ad hoc) employees.

o If not eligible for 100% or 60% credit, an item may still be eligible for credit toward DBE goals, but only for the fee or commission the DBE MSV receives for its services, and only if the following additional criteria are met:

- The DBE MSV must be certified with NAICS code 425120 Wholesale Trade Agents
  - and Brokers
- The DBE MSV must convincingly explain how the prime contractor benefits by transacting business with it rather than directly with the non-DBE vendor from which the DBE MSV is re-selling.

o The usual good faith efforts process applies.
o All credit toward DBE goals is conditional. Actual credit will be determined based upon invoices, receipts, and/or transportation documents/bills of lading, which must be submitted to ODOT as they are received throughout the course of the project.

DBE TRUCKING DISCLOSURE AFFIDAVIT

In order to ensure that Prime Contractors are monitoring DBE trucking/hauling operations on projects with federal funding, prime contractors must complete the DBE Trucking Disclosure Affidavits Section ("Affidavit") when completing and submitting the Prompt Payment Spreadsheet for reimbursement. The Affidavit will be completed by the Prime on the Prompt Payment Spreadsheet and once submitted will be routed to the project's SharePoint site. This information will be used to affirm DBE and non-DBE trucking utilized by each DBE firm performing those duties during the previous month. The LPA/ODOT will monitor trucking with the following requirements for all Local-let projects:

- Prime Contractors will be required to provide a master list of all anticipated DBE trucking firms to the District Construction Monitor (DCM) at the time of the Pre-Construction Meeting.

- If no DBE trucking is anticipated on a project, the Prime will check the box "No Anticipated DBE Trucking Affidavit" on the first submittal of the Prompt Payment Spreadsheet. If DBE

trucking/hauling does occur, the Prime must notify the LPA within seven (7) days of the DBE trucking activity. The Prime will then complete the Affidavits as required below on each Prompt Payment Spreadsheet.

- Prime Contractors will be required to complete the Affidavit disclosing the DBE trucking operations when completing the new Prompt Payment Spreadsheet. the previous month. The Prime will Complete the Trucking Affidavit section on the Prompt Payment Spreadsheet on each reimbursement submittal. The Prime Contractor will select one of the following options on the Trucking Affidavit section of the form.

  - ☐ The DBE firm performed trucking by utilizing their own equipment and workforce and/or work was subcontracted to another DBE (i.e. only trucking that can be counted for DBE participation was utilized).
    - No other information is required. The Prime will sign and submit the Affidavit.
  - ☐ The DBE firm utilized DBE & Non-DBE trucking.
    - If selected, the Prime will provide a list of Non-DBE trucking that was utilized (i.e., not all trucking will earn DBE credit).
  - ☐ No trucking was performed.
    - No other information is required. The Prime will sign and submit the Affidavit.

- The DCM will perform a check of the Affidavit when reviewing the Prompt Payment Spreadsheet when submitted for reimbursement. The LPA and/or Compliance Managers will follow up on any red flags. For example, if the LPA compares information collected during the CUF process with the affidavit and sees any discrepancies.

- Trucking will continue to be monitored at project sites by construction field staff and the LPAs.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor to follow the DBE Trucking Disclosure Affidavit requirements may result in the issuance of sanctions as follows:

- 1st Level Occurrence: The Department will issue a Letter of Reprimand to the contractor (applies if there is a failure to submit the Affidavits and/or the Affidavits are not submitted timely; if the prime completes the No Anticipated DBE Trucking Affidavit, utilizes DBE trucking and does not notify the LPA within seven days of the activity);
- 2nd Level Occurrence: The Department may withhold an estimate in the amount due to the DBE trucking firm that the Affidavit was not submitted for (applies if there is a failure to submit the Affidavits and/or the Affidavits are not submitted timely; if the prime completes the No Anticipated DBE Trucking Affidavit, utilizes DBE trucking and does not notify the LPA within seven days of the activity);
- 3rd Level Occurrence: If a pattern of not submitting the Affidavit(s) persists or the Contractor has falsified, misrepresented or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:

- The Contractor's past project practices;
- The magnitude and the type of offense;
- The degree of the Contractor's culpability;
- Any steps taken to rectify;
- The Contractor's record of performance on other projects; and
- The number of times the Contractor has been previously sanctioned by ODOT.

DBE MSV DIRECTORY - http://www.dot.state.oh.us/Divisions/ODI/SDBE/Pages/DBE-Directory.aspx (select MSV only)

DBE AFFIRMATION FORM - The new DBE Affirmation Form is now available at http://www.dot.state.oh.us/Divisions/ODI/SDBE/Pages/Resources.aspx.

Opening Prompt Payment (PP) Spreadsheet (Trucking Affidavit Section on PP Spreadsheet) through GoFormz:

1. Obtain a MyODOT account
    a. Click Link
    b. Click "Launch MyODOT"
    c. Click: "Click Here"
    d. Complete Account Application under "Request an Account"
2. Getting GoFormz Access
    a. Email GoFormz.Help@dot.ohio.gov put Create GoFormz Account in the subject line
    b. Login for Goformz will be emailed back
    c. Click www.goformz.com

Addition guidance can be found by Click Here

24. PN 013 – 03/15/2019 - DISADVANTAGED BUSINESS ENTERPRISE (DBE) UTILIZATION PLAN AND GOOD FAITH EFFORTS

***Guidance for Bidders – Federally Funded Projects with a DBE Goal**, to ensure compliance with the requirements outlined in PN 013* Click Here

DBE UTILIZATION PLAN

All Bidders shall submit a DBE Utilization Plan at the time of bid setting forth specific information demonstrating how the Bidder will achieve the DBE goal. By submitting a DBE Utilization Plan, the Bidder is affirming that they will be using the DBE firms identified in the Utilization Plan to meet the DBE contract goal. The DBE Utilization Plan shall be submitted with Formstack at time of bid submission. Any bids received without electronic submission of the DBE Utilization Plan at or before bid time, will be deemed unresponsive. **Bidders shall submit their DBE Utilization Plans via: https://odot.formstack.com/forms/dbe_copy.** This file contains the current list of certified DBEs and is updated regularly. The DBE Utilization Plan must be filled out completely and submitted prior to bid opening.

The DBE Utilization Plan shall include the following information:

1) The names and addresses of the certified DBE firm(s) that will be used to meet the DBE goal;
2) A description of the work that each DBE will perform. To count toward meeting a goal, each DBE firm must be certified in a NAICS code applicable to the kind of work the firm would perform on the contract;
3) Whether the DBE firm(s) being used to meet the goal will be utilized as a subcontractor, regular dealer, manufacturer, consultant or other capacity; and
4) The dollar amount of the participation of each DBE firm used to meet the DBE goal.

PROJECTS AWARDED ON ALTERNATES

In the event the project is awarded on alternates which increases or decreases the total dollar amount of the bid, a revision to the DBE Utilization Plan and DBE Affirmation Form(s) shall be submitted and approved by the Office of Small & Disadvantaged Business Enterprise within five (5) calendar days after the notification of the alternates.

DBE AFFIRMATION

The Apparent Low Bidder shall ensure the DBE firms being utilized to meet the DBE goal affirm their participation in the bid within five (5) calendar days after the bid opening to ODOT. The contract dollar amount(s) and/or DBE firm(s) included in the Apparent Low Bidder's DBE Utilization Plan must match the contract dollar amount(s) and/or DBE firm(s) included on the DBE Affirmation Form(s). If the contract dollar amount(s) and/or DBE firm(s) do not match, the Apparent Low Bidder shall utilize the Request to Terminate/Substitute DBE Form located at https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources (form name is DBE Termination Form) and submit for review and approval by the Office of Small & Disadvantaged Business Enterprise within five (5) calendar days of the bid opening.

The Apparent Low Bidder shall utilize the DBE Affirmation Form located at https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources. You will then need to click the link of the webpage "DBE Affirmation Form (PN 013) – Projects sold after September 1, 2018 or thereafter. The DBE Affirmation Form will be utilized as written confirmation from each listed DBE firm that it is participating in the contract in the type and amount of work provided in the Bidder's DBE Utilization Plan. The Apparent Low Bidder shall submit a separate DBE Affirmation Form for each DBE it is utilizing for the DBE goal and their Good Faith Efforts package if they were not able to attain the DBE Goal via DBE participation.

All other Bidders shall submit a DBE Affirmation Form(s) if notified that the information is required in order for ODOT to complete its assessment. Bidders shall have five (5) calendar days from the date of notification to submit all required DBE Affirmation Forms to ODOT. Notification will be by email.

In the event a DBE firm fails to confirm the information contained in the DBE Affirmation Form within five (5) calendar days of bid opening, the Apparent Low Bidder shall submit a Request to Terminate/Substitute DBE Form, as set forth herein. The Request to Terminate/Substitute DBE Form shall be submitted within five (5) calendar days after bid opening in order for the Apparent Low Bidder to still be considered for contract award. The Apparent Low Bidder shall include as its reason for termination the DBE firm's failure to provide a timely affirmation and should include all efforts the Apparent Low Bidder made to obtain the affirmation from the DBE firm and shall attach proof of these efforts, if available. If the Apparent Low Bidder intends to replace the DBE Firm, it shall include the replacement firm's information on the form. In the event the Apparent Low Bidder is unable to affirm a DBE firm included in its original DBE Utilization Plan at bid submission and it results in a goal shortfall, Good Faith Efforts (GFE's) must be submitted by the fifth calendar day after bid opening. All GFE documentation submitted for consideration should demonstrate the efforts the Bidder made prior to the time of bid submission to secure sufficient DBE participation on the project to meet the DBE goal although the Bidder was unable to do so. A DBE firm's failure to timely confirm information contained in the DBE Affirmation Form will be considered as good cause to terminate the DBE firm and will also be considered a part of the Apparent Low Bidder's Good Faith Efforts in meeting the goal.

DBE BIDDERS

In the event that the Bidder is also a certified DBE firm, the Bidder is required to complete a DBE Utilization Plan as set forth above. In this instance, however, the certified DBE Bidder would not need to submit a DBE Affirmation Form for the work it is planning to self-perform in order to meet the goal. ODOT will consider the submission of the bid as the certified DBE Bidder's written confirmation that it is participating in the contract. However, a DBE Affirmation Form must be submitted for all other DBE firms that are being utilized toward the DBE goal.

JOINT VENTURES

In the event that the Bidder is a Joint Venture, the Joint Venture will only be considered a Certified DBE firm if the Joint Venture itself has been certified. The Joint Venture may, however, utilize a Certified DBE firm that is also a partner in the Joint Venture as part of its DBE Utilization Plan. The Certified DBE Firm/Joint Venture Partner, however, does not need to submit a DBE Affirmation Form for any work that the Certified DBE

Firm/Joint Venture Partner is going to perform to meet the goal. ODOT will consider submission of the Joint Venture's bid as the Certified DBE Firm/Joint Venture Partner's confirmation that it is participating in the contract.

GOOD FAITH EFFORTS

In the event that the DBE contract goal established by ODOT is not met, the Apparent Low Bidder shall demonstrate that it made adequate good faith efforts to meet the goal, even though it did not succeed in obtaining enough DBE participation to do so.

If the Apparent Low Bidder does not meet the goal at bid time, the Apparent Low Bidder shall submit its Good Faith Efforts (GFE's) documentation within five (5) calendar days of the bid opening. Submission of DBE affirmation(s) with additional participation sufficient to the meet the DBE contract goal does not cure the Apparent Low Bidder's failure to meet the goal at bid time or eliminate the Apparent Low Bidder's responsibility of submitting GFE's within five (5) calendar days of the bid opening.

The Apparent Low Bidder shall demonstrate its GFE's by submitting the following information within five (5) calendar days after the bid opening:

(1) All written quotes received from certified DBE firms;
(2) All written (including email) communications between the Apparent Low Bidder and DBE firms;
(3) All written solicitations to DBE firms, even if unsuccessful;
(4) Copies of each non-DBE quote when a non-DBE was selected over a DBE for work on the contract;
(5) Phone logs of communications with DBE firms.

The Apparent Low Bidder shall utilize the Pre-Bid GFE Template to document their GFE's. This template and supporting documentation shall be sent along with any DBE Affirmation Forms within five (5) calendar days of bid opening. ODOT has provided Good Faith Efforts Guidance located at https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources

All other Bidders shall submit documentation of GFE's if notified that the information is required in order for ODOT to complete its bid assessment. Bidders shall have five (5) calendar days from the date of notification to submit all required GFE documentation. Notification will be by phone or email.

ODOT shall utilize the guidance set forth in 49 CFR §26.53 Appendix A in determining whether the Bidder has made adequate good faith efforts to meet the goal.

ADMINISTRATIVE RECONSIDERATION

ODOT will review the GFE documentation and issue a written determination on whether adequate GFE's have been demonstrated prior to contract award. If ODOT determines that the Apparent Low Bidder has failed to demonstrate adequate GFE's to meet the goal, the Apparent Low Bidder will have an opportunity for administrative reconsideration prior to the contract being awarded.

As part of this reconsideration, the Apparent Low Bidder may provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so. Such written documentation or argument must be provided to ODOT, attention to the Office of Chief Legal Counsel, 1980 West Broad Street, MS 1500, Columbus, Ohio 43223 (with copy to the Office of Contract Sales, MS 4110), within two (2) business days of ODOT's written determination that GFE's were not adequately demonstrated. The Apparent Low Bidder may also include in their written documentation a request for an in-person meeting to discuss the issue of whether it met the goal or made adequate good faith efforts to do so. ODOT's Office of Chief Legal Counsel will respond to the Apparent Low Bidder within five (5) business days of receiving written documentation or holding the in-person meeting.

ODOT will send the Apparent Low Bidder a written decision on reconsideration explaining the basis for finding that the Apparent Low Bidder did or did not meet the goal or make adequate good faith efforts to do so. The result of the reconsideration process is not administratively appealable to the United States Department of Transportation.

TERMINATION OR REPLACEMENT OF A DBE

By submitting a DBE Utilization Plan, the Bidder is committing to use the DBE firms identified in the plan. The Apparent Low Bidder/Awarded Contractor shall utilize the specific DBEs listed in the DBE Utilization Plan to perform the work and supply the materials for which each is listed unless the Apparent Low Bidder/Awarded Contractor obtains written consent as provided in this paragraph. In order to request termination or substitution of a DBE firm, the Apparent Low Bidder/Awarded Contractor shall utilize the Request to Terminate/Substitute DBE Form located at https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources. Once on the webpage, scroll down to the form named "DBE Termination Form (PN013)

This termination/replacement procedure applies only to DBE firms or the amount of work being utilized to meet the goal.

Without ODOT's written consent to terminate/replace a DBE firm being utilized to meet the goal, the Awarded Contractor shall not be entitled to any payment for DBE listed work or material unless it is performed or supplied by the listed DBE.

GOOD CAUSE

ODOT may provide written consent to terminate a DBE only if it agrees, for reasons stated in a concurrence document, that the Apparent Low Bidder/Awarded Contractor has good cause to terminate the DBE firm.

For purposes of this paragraph, good cause to terminate a DBE includes the following circumstances:

1) The listed DBE firm fails or refuses to provide the required DBE Affirmation Form or to execute a written contract;
2) The listed DBE firm fails or refuses to perform the work of its subcontract in a manner consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE firm to perform its work on the subcontract results from the bad faith or discriminatory action of the awarded contractor;
3) The listed DBE firm fails or refuses to meet the awarded contractor's reasonable, nondiscriminatory bond requirements.
4) The listed DBE firm becomes bankrupt, insolvent, or exhibits credit unworthiness;
5) The listed DBE firm is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215 and 1200 or applicable state law;
6) ODOT has determined that the listed DBE firm is not a responsible contractor;
7) The listed DBE firm voluntarily withdraws from the project and provides to you written notice of its withdrawal;
8) The listed DBE is ineligible to receive DBE credit for the type of work required;
9) A DBE owner dies or becomes disabled with the result that the listed DBE contractor is unable to complete its work on the contract; and
10) Other documented good cause that ODOT determines compels the termination of the DBE firm. Provided, that good cause does not exist if the awarded contractor seeks to terminate a DBE it relied upon to obtain the contract so that the awarded contractor can self-perform the work for which the DBE contractor was engaged or so that the awarded contractor can substitute another DBE or non-DBE contractor after contract award.

REPLACEMENT

When a DBE firm is terminated or fails to complete its work on the contract for any reason the Awarded Contractor must make GFEs to find another DBE firm to replace the original DBE. These GFEs shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal. The GFEs shall be documented by the Awarded Contractor. If ODOT requests documentation under this provision, the Awarded Contractor shall submit the documentation within seven (7) calendar days, which may be extended for an additional seven (7) calendar days if necessary at the request of the contractor, and ODOT shall provide a written determination to the contractor stating whether or not GFEs have been demonstrated.

In addition to post-award terminations, the provisions of this section apply to pre-award deletions and substitutions of DBE firms put forward by Bidders in the DBE Utilization Plan.

ADDITION

In the event additional DBE participation is required for the project, the Awarded Contractor shall utilize the DBE Affirmation Form located at https://www.transportation.ohio.gov/wps/portal/gov/odot/programs/business-economic-opportunity/dbe/dbe-resources. The DBE Affirmation Form, "DBE Affirmation Form (PN013) – Projects sold on September 1, 2018 or thereafter", will be utilized as written confirmation from each DBE firm that it is participating in the contract in the kind and amount of work on the project.

WRITTEN NOTICE TO DBE

Before transmitting to ODOT its request to terminate and/or substitute a DBE firm, the Apparent Low Bidder/Awarded Contractor must give notice in writing to the DBE firm, with a copy to ODOT, of its intent to request to terminate and/or substitute, and the reason(s) for the request.

The Apparent Low Bidder/Awarded Contractor must give the DBE five (5) calendar days to respond to the notice, advising ODOT and the Apparent Low Bidder/Awarded Contractor of the reasons, if any, why it objects to the proposed termination of its subcontract and why ODOT should not approve the Apparent Low Bidder/Awarded Contractor's action. If required in a particular case as a matter of public necessity (e.g., safety), ODOT may provide a response period shorter than five (5) days.

GOAL ATTAINMENT POST AWARD

The Awarded Contractor shall make available upon request a copy of all DBE subcontracts. The Awarded Contractor shall ensure that all subcontracts or agreements with DBEs require that the subcontract and all lower tier subcontractors be performed in accordance with this Proposal Note.

Approval of a DBE Utilization Plan does not ensure approval of C-92 Requests to Sublet nor does approval of a DBE Utilization Plan indicate that the DBE goal has been met. ODOT will monitor goal attainment throughout the life of the project. It is the responsibility of the Awarded Contractor to advise ODOT of any changes to the DBE Utilization plan throughout the life of the project. The DBE goal of a project is stated as a percentage of the contract. In the event the contract amount increases or decreases, the actual dollar amount of the DBE goal for the project may increase or decrease accordingly.

SANCTIONS AND ADMINISTRATIVE REMEDIES

PRE-BID

Failure by the Apparent Low Bidder to do any of the following shall result in the bid being rejected in accordance with ORC §5525.08:

1) Failure to submit a complete DBE Utilization Plan at the time of bid;

2) Failure to submit DBE Affirmation Form(s) and/or failure to submit Request to Terminate/Substitute DBE Form(s) as required by this Proposal Note; and
Failure to meet the goal and/or failure to demonstrate GFEs to meet the goal as required by this Proposal Note.

POST-BID Failure by the Awarded Contractor to carry out the requirements of this Proposal Note, including the submission of adequate good faith efforts to meet the goal for a project, is a material breach of the contract and may result in the issuance of sanctions as follows:

1st Tier:	Letter of Reprimand
2nd Tier:	Damages equivalent to the DBE shortfall
3rd Tier:	If a pattern of paying damages persists or the Contractor has falsified, misrepresented or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:
- the magnitude and the type of offense
- the degree of the Contractor's culpability
- any steps taken to rectify
- the Contractor's record of performance on other projects including, but not limited to:
  - annual DBE participation
  - annual DBE participation on projects without goals
  - the number of complaints ODOT has received regarding the Contractor
  - the number of times the Contractor has been previously sanctioned by ODOT

25. PN - 031 – 9/1/2020 – Local-let Construction Projects

The U.S. Department of Transportation's (DOT's) rules related to Disadvantaged Business Enterprises are published in the Code of Federal Regulations (CFR), 49 CFR Part 26. Within 49 CFR Part 26, 49 CFR 26.29 lays out the prompt payment requirements that apply to ODOT (the Department), it's subrecipients (LPA's), and, by extension, both Prime Contractors and Subcontractors (including non-DBEs). The 49 CFR 26.29 requirements apply only to federally funded contracts (i.e., contracts with DOT financial assistance). The Prime Contractor must comply with this Proposal Note and the Department's prompt payment requirements as published in 107.21 of the Construction and Materials Specifications (C&MS).

The Department will monitor payments made by Prime Contractors and Subcontractors for compliance with this Proposal Note, C&MS 107.21 and, where applicable, 49 CFR 26.29. To facilitate this monitoring, the Department requires prime contractors to report their payments to all subcontractors with the submission of each invoice. The payment data reported must include any retainage withheld and any previously withheld retainage released. All such reporting must take place through a web-based submission on GoFormz. Invoices will not be approved and processed for payment unless this reporting form has been submitted and received by the Department.

The Prime Contractor must report the following information:

1.) The name of the payee;
2.) The dollar amount of the payment to the payee;
3.) The date the payee was paid;
4.) The amount of retainage withheld (if any).

The Prime Contractor must sign each reported payment and submit to ODOT via the GoForms website.

If the Prime Contractor fails to submit the aforementioned documentation with each invoice, they will be determined to be non-compliant and invoices will not be processed for payment.

Payees must verify each payment reported by the payer within 30 days of the payment being signed by the payer. This verification must include:

1.) Whether the payment was received, and if so, whether it was as expected or not;
2.) The dollar amount of the payment received; 2
3.) The date the payment was received.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor to follow Prompt Payment requirements may result in the issuance of sanctions as follows:

1st Tier: Letter of Reprimand

2nd Tier: Damages equivalent to the daily liquidated damages amount found in section 108.07 for each incident of non-compliance

3rd Tier: If a pattern of paying damages persists or the Contractor has falsified, misrepresented or withheld information, ODOT can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:

- the magnitude and the type of offense;
- the degree of the Contractor's culpability;
- any steps taken to rectify;
- the Contractor's record of performance on other projects; and
- the number of times the Contractor has been previously sanctioned by ODOT.

26. WAIVER OF CM&S 614.03

ODOT's 2019 Construction and Material Specifications section 614.03, third paragraph, does not apply to any project which is not physically located on the National Highway System (NHS), and/or does not impact NHS traffic in any way.

27. ODOT AS OBLIGEE ON BOND

The contractor shall furnish a performance and payment bond in an amount at least equal to 100 percent of the estimate as security for the faithful performance of its contract. In addition to the project Owner, ODOT shall be named as an oblige.

28. **NON-DISCRIMINATION** PROVISIONS

1) **Compliance with Regulations:** The CONTRACTOR will comply with the regulations relative to nondiscrimination in Federally-assisted programs of the United States Department of Transportation (hereinafter "U.S. DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the "Regulations"), which are herein incorporated by reference and made a part of this contract.

In addition, the CONTRACTOR will comply with the provisions of the Americans with Disabilities Act, Section 504 of the Rehabilitation Act, FHWA Guidance, and any other Federal, State, and/or local laws, rules and/or regulations (hereinafter referred to as "ADA/504").

(2) **Nondiscrimination:** The CONTRACTOR, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, national origin, sex, age, or disability, in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The CONTRACTOR will not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations, as well as the ADA/504 regulations.

(3) **Solicitations for Contractors or Subcontractors, including Procurement of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the CONTRACTOR for work to be performed under a contract or subcontract, including procurements of materials or leases of equipment, each potential subcontractor, or supplier will be notified by the CONTRACTOR of the CONTRACTOR's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, sex, age, or disability.

(4) **Information and Reports:** The CONTRACTOR will provide all information and reports required by the Regulations or directives issued pursuant thereto, and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the STATE or the Federal Highway Administration (hereinafter "FHWA") to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of the CONTRACTOR is in the exclusive possession of another who fails or refuses to furnish this information, the CONTRACTOR will so certify to the STATE or FHWA, as appropriate, and will set forth what efforts it has made to obtain the information.

(5) **Sanctions for Noncompliance:** In the event of the CONTRACTOR's noncompliance with the nondiscrimination provisions of this contract, the LPA will impose such contract sanctions as it or STATE / FHWA may determine to be appropriate, including, but not limited to:

(a) Withholding of payments to the CONTRACTOR under the contract until the CONTRACTOR complies, and/or

(b) Cancellation, termination or suspension of the contract, in whole or in part.

(6) Incorporation of Provisions: The CONTRACTOR will include the provisions of paragraphs (1) through (5) above in every contract or subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The CONTRACTOR will take such action with respect to any subcontractor procurement as the LPA or STATE / FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that, in the event the CONTRACTOR becomes involved in, or is threatened with, litigation with a subcontractor, or supplier as a result of such direction, the CONTRACTOR may request the LPA / STATE to enter into such litigation to protect the interests of the LPA and the STATE, and, in addition, the LPA / STATE may request the United States to enter into such litigation to protect the interests of the United States.

29. PN 095 – 03/30/2020 Potential Impacts and Delays Due to COVID-19

In an effort to anticipate the potential impacts to the Project caused by the COVID-19 threat and in following direction from the Governor and other authorities, the Contractor is on notice of the need to comply with all federal, state and local orders generated to prevent the spread of contagious or infectious diseases, including the Stay at Home Order from the Ohio Director of Health dated March 22, 2020, and subsequent orders, located through the following website:
https://coronavirus.ohio.gov/wps/portal/gov/covid-19/home
Contractor is on notice that the Project is considered essential and that the contractor and his employees, subcontractors and suppliers are considered essential businesses and performing essential functions as defined under the Stay at Home Order.

Notwithstanding any other provisions of the contract documents, in the event of project delay or impacts to performance due to a voluntary or mandatory COVID-19 virus Directives, Orders, quarantine or closure directed by government authorities, either party may, by providing notice to the other party as required under CMS 108.02(F), extend the Completion Date for a period of up to thirty (30) days. Extensions under this paragraph shall be considered an excusable, non-compensable delay in accordance with CMS 108.06(B). If any portion of the Work is still not able to be performed upon the expiration of the extension, either party may provide notice to the other party requesting a termination for convenience under 108.09. The termination for convenience remains at the sole discretion of the LPA's Person in Responsible Charge in conjunction with the Office of Local Programs.

The Contractor and LPA will exercise best efforts to utilize remote services to perform Work that otherwise cannot be performed in person due to a voluntary or mandatory COVID19 virus quarantine, closure, or impact as directed by Stay at Home Order.

Impacts to the Project generated by the Stay at Home Order shall not be considered an "issue" under 108.02 (F) for Projects sold after the date of this Note. Contractors are on notice that their bids should include any impacts they foresee or should have reasonably foreseen due to the Stay at Home Order or existing or reasonably foreseeable orders by any other federal, state or local official.
If any emergency order or declaration of any government official is lifted at any time, the LPA will provide written notice to the Contractor that this Note shall be considered void thirty (30) days after receipt of the written notice. If the Stay at Home Order from the Ohio Director of Health dated March 22, 2020 is lifted at any time, this Note shall be considered null and void thirty (30) days after the lifting of those orders.

30. PN 015 – 04/17/2020 - CONTRACT PROVISIONS FOR FEDERAL-AID CONSTRUCTION CONTRACTS

The required contract provisions for federal-aid construction contracts (contained in Form FHWA 1273 revised May 2012 and located here) are hereby incorporated by reference as if rewritten herein. Form FHWA-1273 shall be physically incorporated in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreement for supplies or services related to a construction contract). The prime contractor shall be responsible for ensuring that the FHWA-1273 is physically incorporated into all lower-tier subcontracts.

SANCTIONS AND ADMINISTRATIVE REMEDIES

Failure by the prime contractor to include the provisions of FHWA-1273 in their contract or in their lower-tier subcontracts may result in the issuance of sanctions as follows:

1st Tier: Letter of Reprimand

2nd Tier: Damages equivalent to the daily liquidated damages amount found in section 108.07 for each incident of non-compliance

3rd Tier: If a pattern of paying damages persists or the Contractor has falsified, misrepresented or withheld information, the LPA can pursue other remedies available by law including suspension, revocation, and/or debarment.

Factors to be considered in issuing sanctions may include, but are not limited to the following:

- the magnitude and the type of offense;
- the degree of the Contractor's culpability;
- any steps taken to rectify;
- the Contractor's record of performance on other projects; and
- the number of times the Contractor has been previously sanctioned by the LPA.

31. **PN 032 – 01/31/2021 – C92s Required on - Local-let Construction Projects**

State and Federal law requires that all contractors and subcontractors participating on state or federally funded projects be evidenced in writing and in conformity with all applicable state and federal laws and regulations.

Effective immediately, all projects advertising after 2/1/2021, will require that a Request to Sublet (C92) form is completed for each subcontractor working on the project prior to the start of work.

A template for this form may be found and submit via the GoFormz website located at www.goformz.com.

32. REQUIRED CONTRACT PROVISIONS FOR FEDERAL-AID CONSTRUCTION CONTRACTS (Electronic Form FHWA 1273 – May 1, 2012)

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Government wide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order

11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at

rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) The prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) The prime contractor remains responsible for the quality of the work of the leased employees;

(3) The prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) The prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the

cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or

State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

Appendix A

Checklist for Bidders- Federally Funded Projects with a DBE Goal

- ☐ Quotes have been obtained by DBE firms for participation on the project
- ☐ NAICS codes have been verified on the Ohio Unified DBE Directory that the DBE firms to be utilized can be applied toward the project goal for the specific work wanted: http://www.dot.state.oh.us/Divisions/ODI/SDBE/Pages/DBE-Directory.aspx
- ☐ DBE Utilization Plan has been completed & submitted electronically prior to bid opening via: https://odot.formstack.com/forms/dbe_copy (This applies to all Bidders including DBE Firms)
- ☐ The Utilization Plan submitted as described above, meets or exceeds the DBE Goal established for the project
- ☐ If the DBE Goal has not been met that Good Faith Efforts have been submitted prior to bid to opening to: Dot.contractslettingmgr@dot.ohio.gov
- ☐ The affirmation form that is required 5 calendar days after bid opening has been downloaded ready to send out to all DBE firms listed on the Utilization Plan: http://Transportation.ohio.gov/Divisions/ODI/SDBE/Pages/Resources.aspx.

BUY AMERICA CERTIFICATON

(Reference ODOT's LPA Template – Required Contract Provisions, Provision #2)

Buy America Certification

PID: _____ Project Name: CUY – (C.R. __)

Project Description: _____

The undersigned Proposer hereby certifies on behalf of itself and all contractors (at all tiers) that it will meet Buy America requirements in 23 CFR 635.410, using one of the following provisions:

_____ **The product contains no steel or iron products manufactured outside the United States.** To be considered domestic, all steel and iron used and all products manufactured from steel and iron must be produced in the United States and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied. The Buy America process does not apply to this project. If there is ANY foreign steel or iron in your product you may not check this box.

_____ **The product has minimal use of steel or iron products manufactured outside the United States.** The Buy America regulation does "not prevent a minimal use of foreign steel and iron materials, if the cost of such materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or $2,500, whichever is greater. For purposes of this paragraph, the cost is that shown to be the value of the steel and iron products as they are delivered to the project. If this minimal use clause applies to your project, then please provide documentation indicating that this requirement is being met. The Buy America process does not apply to your project.

_____**The product meets the standards for the FHWA Manufactured Products waiver.** FHWA policy provides for a Buy America waiver for certain manufactured products. To be eligible for the Manufactured Products waiver, the product must consist of less than 90% steel or iron content when it is delivered to the job site for installation. Please click here for the full guidance on manufactured products. If your product meets this manufactured products definition, please provide documentation of how the product is a manufactured product and submit to ODOT for approval.

_____ **The product has foreign steel or iron; a Buy America waiver is required.** ODOT may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist. However, Proposer certifies that it will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Department. The waiver process can take time and the project may not move forward until a waiver is completed.

A false certification is a criminal act in violation of 18 USC 1001. Should this Agreement be investigated, Proposer has the burden of proof to establish that it is in compliance.

Proposer: _____
Signature of Authorized Official: _____
Name of Authorized Official: _____
Title: _____
Date: _____

ADDITIONAL INSURANCE COVERAGE REQUIRED

PWD-2682

Old Rockside Road Bridge 00.42 Replacement

ADDITIONAL INSURANCE COVERAGE REQUIRED

Additional Insurance Coverage Required

Each of the following items are required "in addition to" the mandatory County insurance requirements set forth per Section 107.12 of the General Provisions found in Section 100:

Commercial General Liability Insurance to be underwritten by a United States company naming the United States of America, City of Independence and Village of Valley View as additional insured.

Umbrella/Excess Liability Insurance to provide additional insurance limits for commercial general liability and/or automobile liability, with limits of liability not less than:

$10,000,000 each occurrence
$10,000,000 general aggregate
$10,000,000 products/completed operations aggregate

Such insurance shall be written on an occurrence basis and shall sit in excess of the limits and terms set forth in the mandatory Worker's Compensation Insurance, Commercial General Liability Insurance and Business Automobile Liability Insurance required per the General Provisions.

All Risk Equipment Insurance covering all risk of physical damage to equipment provided for use by Contractor.

Professional Liability Insurance/Errors & Omissions Liability Insurance providing coverage for claims arising out of the provision of design, architectural, engineering and/or other professional services with a limit of liability not less than:

$5,000,000 per claim;
$5,000,000 aggregate.

Such insurance may be written on either an occurrence or claims-made basis. However, if written on a claims-made basis, the claims-made retroactive date on the policy shall be prior to the commencement of any design, architectural, engineering or other professional activity related to this Contract.

Pollution Legal Liability Insurance (including Contractors Pollution Liability Insurance, if applicable) with a limit of liability not less than:

$1,000,000 per claim;
$1,000,000 aggregate.

Such insurance may be written on either an occurrence or claims-made basis, however, if written on a claims made-basis, the claims-made retroactive date on the policy shall be prior to the commencement of any work related to this Contract.

Builders Risk Insurance on an All Risks Property Coverage Form covering damage to buildings or other structures while under construction or renovation including materials and fixtures whether or not yet incorporated into the buildings or other structures.

STATE OF OHIO
EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS
AND BID CONDITIONS FOR
OPWC-ASSISTED CONSTRUCTION PROJECTS

OPWC PROPOSAL NOTES – For insertion into Bid Documents (Rev 6/16 & 8/18)

1. STEEL PRODUCTS MADE IN THE UNITED STATES
Domestic steel use requirements as specified in Ohio Revised Code §153.011 apply to this project. Copies of §153.011 can be obtained from any of the offices of the department of administrative services or through http://codes.ohio.gov/orc/153.011.

2. PREVAILING WAGES ON STATE PROJECTS WITH NO FEDERAL-AID (Should this project contain Federal-aid funds then Federal Prevailing Wages must be paid. Contact the appropriate Federal funding agency for language.)
This contract is subject to Ohio Prevailing Wage Laws, Chapter 4115 of the Ohio Revised Code and the Contractor and all subcontractors shall comply with all provisions contained therein or as otherwise provided by this note. The Contractor guarantees that the prevailing wage scale to be paid to all laborers and mechanics employed on this contract shall be in accordance with the schedule of the prevailing hourly wage and fringe benefits as determined by the Ohio Department of Commerce for the county in which the work is being performed. The failure to pay prevailing wages to all laborers and mechanics employed on this project shall be considered a breach of contract. Such a failure may result in the revocation of the contractor's and/or subcontractor's certificate of qualification and debarment. A schedule of the most current prevailing wage rates may be accessed by logging in/registering with the Ohio Department of Commerce, Labor and Worker Safety Division, Wage and Hour Bureau at the following web address:

http://198.234.41.198/w3/webwh.nsf/wrlogin/?openform

The Contractor and all subcontractors shall compensate the employees on this contract at a pay rate not less than the hourly wage and fringe rate listed on the website noted above, for the applicable job classification or as may be modified by the Ohio Department of Commerce, Division of Labor and Worker Safety Wage and Hour Bureau, when new prevailing rates are established.

Overtime shall be paid at one and one-half times the basic hourly rate for any hours worked beyond forty hours during a pay week. The Contractor and all subcontractors shall pay all compensation by company check to the worker and fringe benefit program.

The wage and fringe rates determined for this project or as may be later modified, shall be posted by the Contractor in a prominent and accessible place on the project, field office, or equipment yard where they can be easily read by the workers or otherwise made available to the workers. On the first pay date of contract work the Contractor and all subcontractors shall furnish each employee covered by prevailing wage a completed form (WHPW-1512) in accordance with section 4115.05 of the Ohio Revised Code, showing the classification, hourly pay rate, and fringes, and identifying the public authority's Prevailing Wage Coordinator, if such employees are not covered by a collective bargaining agreement or understanding between employers and bona fide organizations of labor. These forms shall be signed by the Contractor or subcontractor and the employee and kept in the Contractor's or subcontractor's payroll files.

The Contractor and all subcontractors shall submit to the Prevailing Wage Coordinator, certified payrolls on form WHPW-1512 or equivalent, in accordance with sections 4115.07 and 4115.071 (C) of the Ohio Revised Code, three weeks after the start of work and every subsequent week until the completion of the contract. Additionally, a copy of the "Apprentice Certification" obtained from the Ohio State Apprenticeship Council, must accompany all certified payrolls submitted, for all apprentices working on this project. Upon completion of the contract and before the final payment, the Contractor shall submit to the Prevailing Wage Coordinator a final wage affidavit in accordance with section 4115.07 of the Ohio Revised Code stating that wages have been paid in conformance with the minimum rates set forth in the contract. Please be aware that it is ultimately the responsibility of the Contractor to ensure that all laws relating to prevailing wages in Chapter 4115 of the Ohio Revised Code are strictly adhered to by all subcontractors.

The Contractor and all subcontractors shall make all of its payroll records available for inspection, copying or transcription by any authorized representative of the contracting agency. Additionally, the Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job.

3. UNRESOLVED FINDING FOR RECOVERY

The Contractor affirmatively represents to the local contracting authority that it is not subject to a finding for recovery under Ohio Revised Code §9.24, or that it has taken the appropriate remedial steps required under §9.24 or otherwise qualifies under that section. The Contractor agrees that if this representation is deemed to be false, the contract shall be void ab initio as between the parties to this contract, and any funds paid by the state hereunder shall be immediately repaid to the local contracting authority, or an action for recovery may be immediately commenced by the local government and/or for recovery of said funds.

4. OHIO WORKERS' COMPENSATION COVERAGE

The Contractor must secure and maintain valid Ohio workers' compensation coverage until the project has been finally accepted by the local contracting authority. A certificate of coverage evidencing valid workers' compensation coverage must be submitted to the local contracting authority before the contract is executed.

The Contractor must immediately notify the local contracting authority, in writing, if it or any subcontractor fails or refuses to renew their workers' compensation coverage. Furthermore, the Contractor must notify the local contracting authority, in writing, if its or any of its subcontractor's workers' compensation policies are canceled, terminated or lapse.

The failure to maintain valid workers' compensation coverage shall be considered a breach of contract

which may result in the Contractor or subcontractor being removed from the project, withholding of pay estimates and/or termination of the contract.

5. DRUG-FREE WORKPLACE PROGRAM

In accordance with Ohio Revised Code §153.03 and during the life of this project, the Contractor and all its Subcontractors that provide labor on the Project site must be enrolled in and remain in good standing in the Ohio Bureau of Worker's Compensation ("OBWC") Drug-Free Workplace Program ("DFWP") or a comparable program approved by the OBWC.

6. BID GUARANTY

In accordance with Ohio Revised Code §153.54, the contractor shall file with the bid a bid guaranty in the form of either: 1) a bond for the full amount of the bid, or 2) a certified check, cashier's check, or letter of credit equal to 10% of the bid.

8. OHIO ETHICS LAW

Contractor agrees that it is currently in compliance and will continue to adhere to the requirements of Ohio Ethics law as provided by Section 102.03 and 102.04 of the Ohio Revised Code.

STATE OF OHIO EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS
NOTICE TO CONTRACTORS:

The provisions of the Ohio Administrative Code (OAC) 123:2-3-02 through 124:2-9 regarding Equal Employment Opportunity on State Construction Contracts and State-assisted Construction Contracts, and OAC 123:2-3-02 through 123:2-9 regarding Equal Employment Opportunity and Female Utilization Goals are applicable to this project, and each contractor will be required to comply in all aspects of these provisions.

CERTIFICATE OF COMPLIANCE FOR EEO PURPOSES:

All prime contractors must secure a valid Certificate of Compliance from the Department of Administrative Services, Equal Opportunity Division, prior to execution of a construction contract.

See http://www.das.ohio.gov/Divisions/EqualOpportunity/CertificateofCompliance/tabid/129/Default.aspx for instructions for electronic filing.

>>> Does this bidder have a valid Certificate of Compliance? ____Yes ____No

>>> If "No" to the above, will this bidder be able to obtain a valid Certificate of Compliance prior to the execution of a contract? ____Yes ____No

Bidder must provide a "Yes" answer to one or the other of the above questions.

BIDDER'S AFFIRMATIVE ACTION REQUIREMENTS:

Each prime contract bidder must submit an affirmative action program regarding equal employment opportunity to and receive approval from the State Equal Employment Opportunity (EEO) Coordinator prior to the bid opening, **OR** the prime contract bidder must have evidence within its bid adoption of the minority and female utilization work hour utilization goals and the specific affirmative action steps set forth in 123:2-3 through 123:2-9 of the Ohio Administrative Code.

>>> Has the prime contract bidder prepared and submitted an Affirmative Action Program to the State Equal Employment Opportunity Coordinator and that program has been approved by the State Equal Employment Opportunity Coordinator prior to the bid opening ? ____Yes ____No

>>>If “no”, with this bid response, the prime contract bidder hereby adopts the minority and female work hour utilization goals and the specific affirmative action steps set forth in 123:2-3 through 123:2-9 of the Ohio Administrative Code.

BIDDER'S EEO COVENANTS:

Throughout its performance of any contract awarded to it on this State-assisted project, the prime contract bidder agrees to the following covenants:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry or sex. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, national origin, ancestry or sex. Such action shall include, but is not limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will in all solicitations or advertisements for employees placed by or on behalf of the prime contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry or sex.

(3) The contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided by the State Administering Agency advising the said labor union or workers' representatives of the contractor's commitments under this covenant and shall post copies of the notice in conspicuous places available to

employees and applicants for employment.

(4) The contractor will comply with all provisions of the Ohio Department of Administrative Services, Equal Opportunity Division and with the implementing rules, regulations and applicable orders of the State Equal Employment Opportunity Coordinator.

(5) The contractor agrees to fully cooperate with the State Administering Agency, the State Equal Employment Opportunity Coordinator and with any other official or agency, or the State or Federal government which seeks to eliminate unlawful employment discrimination, and with all other State and Federal efforts to assure equal employment practices under its contract and the contractor shall comply promptly with all requests and directions from the State Administering Agency, the State Equal Employment Opportunity Coordinator and any of the State of Ohio officials and agencies in this regard, both before and during construction.

(6) Full cooperation as expressed in clause (5), above, shall include, but not be limited to, being a witness and permitting employees to be witnesses and complainants in any proceeding involving questions of unlawful employment practices, furnishing all information and monthly utilization work hour reports required by the OAC 123: 2-9-01 and by the rules, regulations and orders of the State Equal Employment Opportunity Coordinator pursuant thereto, and permitting access to its books, records, and accounts by the State Administering Agency and the State Equal Employment Opportunity Coordinator for purposes of investigation to ascertain compliance with such rules, regulations and orders. Specifically, contractors will submit workforce utilization reports to the State Equal Opportunity Coordinator by the 10th of each month. The monthly reports must be electronically submitted through the following website: http://das.ohio.gov/EOD/CCInputForm29.htm

(7) In the event of the contractor's noncompliance with the nondiscrimination clauses of its contract or with any of the said rules, regulations, or orders, its contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further State Contracts or State-assisted Construction Contracts in accordance with procedures authorized in OAC 123:2-3 through 2-9 and such other sanctions may be instituted and remedies invoked, as provided in OAC 123:2-3 through 2-9 or by regulation, or order of the State Equal Employment Opportunity Coordinator, or as otherwise provided by law.

In the event that its contract is terminated for a material breach of OAC 123:2-3 through 2-9 the contractor shall become liable for any and all damages which shall accrue to the State Administering Agency and Applicant and the State of Ohio as a result of said breach.

(8) The contractor will require the inclusion of language reflecting these same eight covenants within every subcontract or purchase order it executes in the performance of its contract unless exempted by rules, regulations or orders of the State Equal Employment Opportunity Coordinator issued pursuant to O.A.C. 123:2-3-02 so that these provisions will be binding upon each subcontractor or vendor. The contractor will take such actions as the Administering Agency may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in any litigation with a subcontractor, vendor or other party as a result of such direction by the State Administering Agency, the contractor may be requested to protect the interests of the State.

>>>The prime contract bidder hereby adopts the foregoing covenants ? ___Yes ____No

BIDDER'S CERTIFICATION:

The undersigned, being a duly authorized officer of the prime contract bidder, does hereby certify to and agree with the foregoing statements and covenants regarding its subscription to the State's Equal Employment Opportunity Requirements for State-assisted Construction Contracts.

_____ ___/____/___
Signature of Authorized Officer Date

_____
Title

>>> PLEASE NOTE: Only a bidder possessing a valid certificate will be awarded a contract pursuant to Chapter 153 of the Revised Code by an owner referred to in section 153.01 of the Revised Code. Application shall be made at least ten working days prior to the date that the bidder expects to receive the certificate. The bidder's failure to elect one of the two Bidder's Affirmative Action Requirements, adopt the Bidder's EEO Covenants, and complete the foregoing certification may cause the bidder's proposal to be rejected as being non-responsive to the State's Equal Employment Opportunity Requirements and in non-compliance with the State Equal Employment Opportunity Bid Conditions. In addition, the bidder must, prior to the execution of a contract, submit to the local subdivision a valid Certificate of Compliance for Equal Employment Opportunity purposes.

"APPENDIX A" OF THE STATE EEO BID CONDITIONS

MINORITY MANPOWER UTILIZATION GOALS AND TIMETABLES

The following minority goals listed are expressed in terms of percentages of work hours for each trade to be used by the contractor in a designated area. Designated areas are defined as Ohio's Standard Metropolitan Statistical Areas (SMSA). They are: Akron, Cincinnati, Cleveland, Columbus, Dayton, Toledo and Youngstown-Warren. In cases where the project is not located in a designated area, the contractor may adopt minority utilization goals of the near/nearest designated area.

AKRON	
All Trades	10%

COLUMBUS	
All Trades	10%

DAYTON	
All Trades	11%

TOLEDO	
All Trades	9%

YOUNGSTOWN	
All Trades	9%

CINCINNATI	
Trade	
Asbestos Workers	9%
Boilermakers	9%
Carpenters	10%
Elevator Constructors	11%
Floor Layers	10%
Glaziers	10%
Lathers	10%
Marble, Tile, Terrazzo	8%
Millwright	10%
Operating Engineers	11%
Painters	11%
Pipefitters	11%
Plasterers	10%
Plumbers	11%
Sheet Metal Workers	11%
Other Trades	11%

CLEVELAND	
Trade	
Asbestos Workers	17%
Boilermakers	10%
Carpenters	16%
Electricians	20%
Elevator Constructors	20%
Floor Layers	11%
Glaziers	17%
Ironworkers	13%
Operating Engineers	17%
Painters	17%
Pipefitters	17%
Plasterers	20%
Plumbers	17%
Roofers	17%
Other Trades	17%

"APPENDIX B" OF THE STATE EEO BID CONDITIONS

SPECIFIC AFFIRMATIVE ACTION STEPS

The following Affirmative Action steps are directed at increasing minority utilization:

(1) The contractor should maintain a file of the names and addresses of each minority and female referred to it by any individual or organization and what action was taken with respect to each such referred individual, and if the individual was not employed by the contractor, and the reasons therefore. If such individual was sent to the union hiring hall for referral and not referred back by the union or if referred back by the union or if referred, not employed by the contractor, the file should document this and the reason therefore.

To Demonstrate Compliance: Maintain a file of the names, addresses, telephone numbers, and craft of each minority and female applicant showing (a) the date of contact and whether the person was hired; if not, the reason, (b) if the person was sent to a union for referral, and the results (c) follow-up contacts when the contractor was hiring.

(2) The contractor should promptly notify the State Contracting Agency when the Union or Unions with which the contractor has collective bargaining agreements does not refer to the contractor a minority or female worker referred (to the union) by the contractor, or when the contractor has information that the union referral process has impeded efforts to meet its goals.

To Demonstrate Compliance: Have a copy of letters sent, or do not claim the union is impeding the contractors' efforts to comply.

(3) The contractor should disseminate its Equal Employment Opportunity policy within its organization by including it in any company newsletters and annual reports; by advertising at reasonable intervals in union publications; by posting of the policy; by specific review of the policy with minority and female employees; and by conducting staff meetings to explain and discuss the policy.

To Demonstrate Compliance: Have a written EEO policy which includes the name and how to contact the contractor's EEO Officer and (a) include the policy in any company policy manuals, (b) post a copy of the Policy on all company bulletin boards (in the office and on all job sites), (c) records, such as reports or diaries, etc., that each minority and female employee is aware of the Policy and that it has been discussed with them, (d) that the policy has been discussed regularly at staff meetings and (3) copies of newsletters and annual reports which include the Policy.

(4) The contractor should continually monitor all personnel activities to ensure that its EEO policy is being carried out, including the evaluation of minority and female employees for promotional opportunities on a quarterly basis and the encouragement of such employees to seek those opportunities.

To Demonstrate Compliance: Have records that the company EEO Officer reviews all: (a) monthly workforce reports, (b) hiring and terminations, (c) training provided on-the-job, (d) minority and female employees quarterly for promotion and encourages them to prepare for and seek promotion. The records should be the EEO Officer's job description, reports, memos, personnel files, etc., documenting the activities for possible discriminatory patterns.

(5) The contractor should disseminate its EEO policy externally by informing and discussing it with all recruiting sources; by advertising it in news media, specifically including minority and female news media; and by notifying and discussing it with all subcontractors.

To Demonstrate Compliance: Have copies of (a) letters sent, at least six months or at the start of each new major contract, to all recruiting sources (including labor unions) requiring compliance with the

Policy, (b) advertising, which has the EEO "tagline" on the bottom, and (c) purchase order and subcontract agreement forms will include or make reference to the State EEO Covenant, Appendix A or B of the Ohio Administrative Code 123:2-3-02.

(6) The contractor should make specific and reasonably recurrent oral and written recruitment efforts directed at minority and women's organizations, and training organizations with the contractor's recruitment area.

To Demonstrate Compliance: Have a record either in a follow-up file for each organization or on the reverse of the notification letter sent under Item 1, above, of the dates, individuals contacted and the results of the contract from telephone calls or personal meetings with the individuals or groups notified under Item 1.

(7) The contractor, where reasonable, should develop on-the-job training opportunities and participate and assist in all Department of Labor funded and/or approved training programs (including Apprenticeship) Programs relevant to the contractor's employee needs consistent with its obligations in the Bid Conditions.

To Demonstrate Compliance: Have records of contributions in cash, equipment supplied and/or contractor personnel provided as instructors for Bureau of Apprenticeship and Training approved or Department of Labor funded training programs and records of the hiring and training of minorities and females referred to Company by such programs.

(8) The contractor should solicit bids for subcontracts (and joint ventures) from available minority and female subcontractors engaged in the trades covered by the Bid Conditions, including circulation of minority and female contractors associations.

To Demonstrate Compliance: Have copies of letters or other direct solicitation of bids for subcontracts/joint ventures from minority/female contractors with a record of the specific response and any follow-up the contractor has done to obtain a price quotation or to assist a minority/female contractor in preparing or reducing a price quotation; have a list of all minority/female subcontracts awarded or joint ventures participated in with dollar amounts, etc.

EXPLANATION OF AN ACCEPTABLE AFFIRMATIVE ACTION PROGRAM:

An Affirmative Action Program is a set of specific and result-oriented procedures to which a Contractor shall apply every good faith effort. The objective of those procedures and efforts is to assure equal employment opportunity. An acceptable Affirmative Action Program will include an analysis of all trades employed by the Contractor within the last year with an explanation of whether Minorities are currently being under-utilized in any one or more trades. A necessary prerequisite to the development of a satisfactory Affirmative Action Program is the identification and analysis of problem areas inherent in Minority employment and an evaluation of opportunities for utilization of Minority group personnel.

Part I - Basic Contents of an Affirmative Action Program:

1. Development or reaffirmation of the contractor's EEO policy in all personnel actions.

2. Formal internal and external dissemination of contractor's EEO policy.

3. Establishment of responsibilities for implementation of the contractor's affirmative action program.

Special Provisions

4. Identification of problem areas (deficiencies) by organizational units and job classification.

5. Establishment of goals and objectives by organizational units and job classification, including timetables for completion.

6. Development and execution of action oriented programs designed to eliminate problems and further designed to attain established goals and objectives.

7. Design and implementation of internal audit and reporting systems to measure effectiveness of the total programs.

8. Compliance of personnel policies and practices with Federal sex discrimination guidelines (41 CFR Part 60-20).

9. Active support of local and national community action programs and community service programs, designed to improve the employment opportunities of minorities.

10. Consideration of ethnic minorities and women not currently in the work force having requisite skills who can be recruited through affirmative action measures.

11. Summary data on applicant flow, hires, terminations and promotions, and training for the last twelve months or the last one hundred applicants, hires, etc., whichever is less.

Part II - Analysis of Individual Trades

1. The minority population of the labor area surrounding (contractor's) projects.

2. The size of the minority unemployment force in the labor area surrounding (the contractor's) projects.

3. The percentage of minority work force as compared with the total work force in the immediate labor area.

4. The general availability of minorities having requisite skills in the immediate labor area.

5. The availability of minorities having requisite skills in the area in which the contractor can reasonably recruit.

6. The availability of promotable minority employees within the contractor's organization.

7. The anticipated expansion, contraction, and turnover of an in the work force.

8. The existence of training institutions capable of training minorities in the requisite skills.

9. The degree of training which the contractor is reasonably able to undertake as a means of making all job classes available to minorities.

Goals, timetables and affirmative action commitments must be designed to correct any identifiable deficiencies. Where deficiencies exist and where numbers or percentages are relevant in developing corrective action, the contractor shall establish and set forth specific goals and timetables. Such goals and timetables, with supporting data and the analysis thereof shall be a part of the contractor's written affirmative action program. Where the contractor has not established a goal, its written affirmative action program must specifically analyze each of the factors listed above, and must detail its reason for a lack of a goal. The goals and timetables should be attainable in terms of the contractor's analysis of

its deficiencies and its entire action. Thus, in establishing its goals and timetables, the contractor should consider the results which could be reasonably expected from its good faith efforts to make its overall affirmative action program work. If the contractor does not meet its goals and timetables, the contractor's good faith efforts shall be judged as to whether the contractor is following its program and attempting to make the program work toward the attainment of its goals.

Support data for the above analysis and program shall be compiled and maintained as part of the contractor's affirmative action program. This data should include applicant flow data and applicant rejection ratios indicating minority status.

Compliance Status: No State Contractor's compliance status shall be judged alone by whether or not he reaches his goals and meets his timetables. Rather each Contractor's compliance posture shall be reviewed and determined by reviewing the contents of his program, the extent of his adherence to his program and his good faith efforts to make his program work toward the realization of the program's goals within the timetables set for completion.

"APPENDIX C" OF THE STATE EEO BID CONDITIONS

FEMALE UTILIZATION GOALS

OAC 123:2-3-05 Required utilization analysis and goals

(A) Each state-involved contractor shall include in his/her affirmative action program the information and analysis required pursuant to part IV 401-C of appendix A of rule 123:2-1-01 of the Administrative Code, in addition to female utilization requirements pursuant to the governor's "Executive Order 84-9" and this rule.

(B) As required by the governor's "Executive Order 84-9", the utilization of women shall be, at a minimum, that currently in use by the federal government as of February 15, 1984. This requirement stated at C.F.R. part 60-4 is 6.9 percent utilization of women. This requirement shall remain at 6.9 percent unless further amended by the governor in a subsequent order. This requirement shall be met by a determination of work hours utilized in the same manner as minority utilization hours are calculated.

STRUCTURE FOUNDATION EXPLORATION AND CONDITION ASSESSMENT REPORT

Final Structure Foundation Exploration Report

Old Rockside Road Bridge Replacement, PID 91563
Independence and Valley View, Cuyahoga County, Ohio
Revised September 9, 2021
Terracon Project No. N6175053

Prepared for:
Burgess & Niple, Inc.
Painesville, Ohio

Prepared by:
Terracon Consultants, Inc.
Parma, Ohio

March 18, 2021
Revised September 9, 2021

Burgess & Niple, Inc.
100 West Erie Street
Painesville, Ohio 44077

Attn: Mr. Jeffrey A. Ackerman, PE – Project Manager
P: (440) 354-9700
E: jeff.ackerman@burgessniple.com

Re: Final Structure Foundation Exploration Report
Old Rockside Road Bridge Replacement, PID 91563
Independence and Valley View, Cuyahoga County, Ohio
Terracon Project No. N6175053

Dear Mr. Ackerman:

We have completed geotechnical exploration and engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PN6175053 dated May 9, 2017. This report replaces our original final report, dated March 18, 2021 and presents the findings of the subsurface exploration and provides geotechnical recommendations concerning the design and construction of the foundations, abutments, and retaining wall for the planned replacement bridge.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

For:
Lynton L. Price, P.E.
Senior Project Manager
(retired)

Russ Gatermann, P.E.
Project Engineer

Thomas F. McDonnell, P.E.
Principal

REPORT TOPICS

EXECUTIVE SUMMARY I
INTRODUCTION 1
GEOLOGY AND OBSERVATIONS 2
EXPLORATION 2
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Note:. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

SITE LOCATION AND EXPLORATION PLAN
EXPLORATION RESULTS
SUPPORTING INFORMATION
CALCULATIONS

Note: Refer to each individual Attachment for a listing of contents.

EXECUTIVE SUMMARY

Terracon Consultants, Inc. was retained by Burgess & Niple, Inc. to perform a geotechnical exploration for the proposed replacement of the Old Rockside Road Bridge that spans the Cuyahoga River. The work performed for this geotechnical evaluation included the performance of three test borings at the bridge location and two borings within the existing roadway on either side of the bridge. Based on the results of the test borings, the following geotechnical considerations were identified.

- The bridge site overlies an approximately 150 feet deep buried valley. The soils within the buried valley consist primarily of glacial lakebed deposits of sandy silt, silt and clay, silty clay, silt and clay. These soils were medium stiff to very stiff to depths of between about 56 and 71 feet below the existing grades, or to elevations ranging between about 537 and 543 feet. MSL. At greater depths, the soils were stiff to hard.

- Because the bridge is a waterway crossing, deep foundations will be used for the support of the new bridge. Based on the soil and groundwater conditions encountered, and the Ohio Department of Transportation preferences, recommendations for cast-in-place (CIP) reinforced concrete pipe piles were developed. Two different pile sizes were considered. Tables and graphs indicating the ultimate pile resistance versus depth of penetration below the pile cap are included in this report.

- At structure borings B-002, B-003 and B-004, groundwater was encountered well above the currently anticipated elevation of the bottom of the pile cap for the bridge piers (assuming that the preferred three-span replacement bridge option is selected). In addition, the bridge piers are expected to the founded below the bottom of the river channel. As a consequence, it is anticipated that temporary shoring and a dewatering system will be required during construction to maintain dry excavations for the pier construction.

- A temporary bridge is to be constructed immediately north of the existing bridge to maintain access to the businesses and Cuyahoga Valley Scenic Railroad train station west of the Cuyahoga River for use during construction of the replacement bridge. The temporary bridge is to be supported on CIP pile foundations. Based on the close proximity of the temporary bridge to the new bridge, and the uniformity of the soil conditions encountered in the structure borings performed for the bridge, it is our opinion that the pile design recommendations offered for the new bridge may be used for the design of the piles for the temporary bridge.

- Embankment construction will be needed to achieve the proposed grades of the temporary road that will be built to route traffic, via the temporary bridge, over the Cuyahoga River, during the construction of the permanent replacement bridge. The embankment will be 8 to 10 feet high at the temporary bridge abutment locations. We estimate that the foundation soils underlying the deepest portions of the embankment could experience up to 1.5 inches

of settlement. Two approaches can be taken: wait for the settlement to occur before driving piles or drive the piles before settlement occurs and incorporate downdrag forces in the driven pile design. Due to the magnitude of the downdrag loads, we understand the intent is to wait for substantial completion of the settlement of the foundation soils prior to driving the piles and downdrag loads are not being considered in the current pile design. Therefore, pile driving should be delayed until primary consolidation of the foundation soils is substantially complete as confirmed by a field settlement monitoring program. We recommend a minimum of two (2) settlement platforms behind each abutment at the maximum embankment fill locations. We anticipate 90% consolidation will take place within about 7 days of finishing fill placement.

- Based on profile plans provided by Burgess & Niple, we anticipate that approximately 2.5 feet of fill will be required on the west side of the bridge to raise the roadway profile to the proposed grade of the bridge. We recommend using Item 204 Granular Material Type C for the proposed fill. Boring B-001, conducted on this side of the bridge, encountered relatively weak soil with elevated moisture contents directly beneath the pavement. Based on this, we recommend placing a layer of geogrid on the subgrade before placing new fill material on the west side of the bridge. The intent of the geogrid layer is to provide a reinforcing element between the relatively weak existing soils and new fill soils. We recommend the layer of geogrid extend a minimum of 18 inches beyond the edge of the surface of the pavement or paved shoulders. We understand as much as about 6 feet of fill is required for National Park Drive on the west side of the bridge. In this area, we recommend a minimum thickness of about 2.5 feet of Item 204 Granular Material Type C. The remainder of the fill can consist of Item 203 Embankment material.

- On the east side of the bridge, the pavement was found to be underlain by approximately 3 feet of granular fill, which was in-turn underlain by silt. Provided the subgrade conditions encountered in the proposed roadway areas are consistent with those evidenced at this boring location, subgrade stabilization is not expected to be necessary on this side of the bridge.

This geotechnical executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding on the items contained herein.

Final Structure Foundation Exploration Report

Old Rockside Road Bridge Replacement, PID 91563
Independence and Valley View, Cuyahoga County, Ohio

Terracon Project No. N6175053
September 9, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed replacement of the Old Rockside Road Bridge that spans the Cuyahoga River in the Village of Valley View and the City of Independence, Cuyahoga County, Ohio.

The existing bridge is approximately 134 feet long and was built in 1960. It is a two-span, prestressed concrete box beam and girder bridge with a concrete, cast-in-place deck and asphalt wearing surface. The bridge has shallow bearing modified stone abutments, and a centrally located hammerhead pier supported on deep foundations consisting of driven cast-in-place (CIP) concrete pipe piles. The abutments are located on the east and west sides of the river, and the pier is located in about the middle of the river.

It is our understanding that the existing bridge is to be replaced with a new bridge structure at the same location. We further understand that the preferred replacement bridge will be a three-span steel beam bridge. The new bridge will be about 113 feet longer than the existing bridge.

It is currently planned to replace the existing stone abutments with jointless, semi-integral stub abutments on cast-in-place concrete pipe piles. The existing hammerhead pier in the river will be removed and replaced with two new, wider, wall-type piers supported on cast-in-place concrete pipe piles. The new abutments will be located close to the current edges of the river.

In conjunction with constructing the bridge, the abutment slopes would be regraded to widen the water course, and slope protection would be installed.

It is anticipated the roadway profile over the river will be raised about 2 feet, and that a minor amount of roadway work will be required to horizontally and vertically tie the proposed structure profile into the existing roadway alignment on either side of the bridge.

A low height (max 5-foot high) retaining wall will be required on the south side of Old Rockside Road, east of the Cuyahoga River to accommodate the grade difference between the level of the new roadway and the level of the adjacent Thornburg Station parking lot. The retaining wall will start at the bridge abutment and will extend east approximately 100 feet. The wall will be a cast-in-place concrete cantilever wall with a shallow bearing spread footing.

A temporary bridge is to be constructed north of the existing bridge location to route traffic over the Cuyahoga River while the replacement bridge is being constructed. The temporary bridge will be a 200-foot single span modular steel truss, which will sit on temporary reinforced concrete abutments, which will be founded on CIP pile foundations. Embankment construction will be needed to achieve the proposed grade of the roadway approach to the bridge. The embankment will be 8 to 10 feet high at the temporary bridge abutment locations.

GEOLOGY AND OBSERVATIONS

The bridge site is located over a deep buried valley which was cut into the rock prior to, and between periods of Pleistocene glaciation. Based on the Ohio Department of Natural Resources, Division of Geological Survey's 1996 Bedrock Topography Map of the Cleveland South Quadrangle, the top of bedrock is located at an elevation of about 450 feet (i.e., about 150 feet below the current site grades). The soils within the buried valley consist primarily of lacustrine sediments of silt and clay, which were deposited into lakes which existed in Cuyahoga County when the glaciers receded after the last period of glaciation. Melt-out or lodgment tills and granular outwash deposits may also have been deposited within the buried valleys as the glaciers repeatedly retreated and advanced over the area during the Pleistocene period.

We visited the site prior to drilling and during the drilling operations. At the time of our site visits, the water within the river was only a few feet deep. We observed that the slope protection was eroded from the abutment face on the east bank of the river. The western bank of the river was covered with concrete rubble. We did not observe any obvious signs of scour at the bridge location nor signs of settlement or lateral movement of the existing abutments.

EXPLORATION

Five test borings were performed for the project between May 15 and May 21, 2019. The boring locations were selected by Terracon and were located in the field using a hand-held GPS unit. Precise locations and elevations of the test borings were determined by Burgess & Niple after the completion of the drilling operations. The site and test boring locations are shown on the **Site Location and Exploration Plans** attached to this report.

The test borings were drilled using a Mobile B-57 track-mounted drill rig and Mobile B-57 truck rig. Borings B-002-0-19, B-003-0-19 and B-004-0-19 were located in proximity to the existing bridge abutments and were advanced to depths ranging between about 110 and 120 feet below the existing ground surface elevation. The other two borings, B-001-0-19 and B-005-0-19, were located in Old Rockside Road, west and east of the bridge and were terminated at a depth of about 8 feet below the existing grade.

During the auger drilling operations, soil sampling was performed at prescribed intervals using split barrel sampling procedures. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound CME auto-hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The automatic hammers used for the split-barrel sampling operations on this project were calibrated on November 13, 2018. The average drill rod energy ratio (ER) for the Mobile B-57 truck rig and the B-57 track rig were 93.8% and 93.0%, respectively. Based on this hammer efficiency, the measured N-value was corrected to an equivalent rod energy ratio (N_{60}) value of 60 percent per ODOT requirements. These N_{60} values, which are noted on the attached test boring logs, have been considered in the interpretation and analysis of the subsurface information for this report. The split-spoon soil samples obtained during the drilling operations were placed in air tight jars and taken to our laboratory for further examination, testing, and classification.

In addition to the SPT samples, thin walled tube samples (Shelby tubes) were obtained at selected depths. Immediately upon removing the Shelby tube samples from the ground, the ends of the tube were sealed with plastic caps and duct tape to prevent soil moisture loss prior to testing.

The field exploration included observations of groundwater during and following the completion of each boring. At the completion of the drilling operations, the bridge borings were sealed using a Portland cement and bentonite grout mix, while the roadway borings were backfilled using soil cuttings. All borings within the road were patched with cold mix asphalt to match the thickness of the existing pavement.

A field log of each boring was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include modifications based on laboratory observation and tests of the samples.

Laboratory Testing Description

Samples retrieved during the drilling operations were taken to our laboratory and were classified in accordance with the Ohio Department of Transportation (ODOT) Soil Classification System.

Laboratory tests were conducted on selected soil samples. The laboratory test results were used for the geotechnical engineering analyses, and the development of subgrade stabilization recommendations, pavement subgrade design parameters, foundation design recommendations, and lateral earth pressure recommendations.

The following tests were performed on selected soil samples obtained from the borings:

- Hand Penetrometer
- Atterberg Limits (ASTM D 4318)
- Unconsolidated-Undrained (UU) Triaxial Compression (ASTM D 2850)
- Water Content (ASTM D 2216)
- Particle Size Analysis (ASTM D 422)

The hand penetrometer, water content, Atterberg limits, and particle size distribution test results are shown on the test boring logs in the **Exploration Results** appendix. The Atterberg limits and particle size analysis laboratory test reports are also included in the **Exploration Results** appendix. The results of the UU tests are included in the **Exploration Results** appendix.

FINDINGS

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization forms the basis of our geotechnical calculations and geotechnical design recommendations. Our general characterization of the subsurface conditions is described below.

Structure Borings B-002, B-003 and B-004

Structure borings B-002 and B-004 were located adjacent to the existing bridge abutments and were performed at the existing roadway level. At these locations, the roadway pavement was found to consist of 8 to 12 inches of asphalt over 8 to 12 inches of granular base (crushed limestone). Beneath the pavement, sandy silts and silt and clays were primarily encountered to a depth of about 15.5 feet (elevation 591.5 feet) at B-002 and about 20.5 feet (elevation 587.2 feet) at B-004. For the most part, the cohesive soils within this zone were medium stiff to stiff and the non-cohesive soils were very loose to loose. Much of these soils could be fill, though they did not contain rubble or differ significantly from the native soils in this area to be certain.

Structure boring B-003 was located on the river bank on the south side of the existing bridge, near its west abutment. At this location, approximately 12 inches of topsoil was encountered. The topsoil was underlain by medium stiff to stiff, sandy silt to a depth of about 8 feet (elevation 591.6 feet).

At all three test locations, a layer of sand and gravel was encountered beneath the soils described above. The sand and gravel was very loose to medium dense and was 3.5 to 7.5 feet thick (extending to an elevation of about 584 feet at B-002 and B-004 and 587 feet at B-003).

Fine, lacustrine deposits were encountered beneath the granular layer and extended to the terminal depths of these structure borings. The lacustrine soils included sandy silts, silts, silty clays and silt and clays. These soils were medium stiff to very stiff to depths of about 66, 56.5, and 71 feet at boring locations B-002, B-003 and B-004, respectively. These depths correspond to an elevation of about 541 feet at B-002, 543 feet at B-003, and 537 feet at B-004. At greater depths the soils were stiff to hard.

Roadway Borings B-001 and B-005

The existing pavement was found to consist of 15 to 16 inches of asphalt. The asphalt was underlain by approximately 4 inches of granular base at boring B-001 and approximately 4 feet of very dense granular fill at B-005.

Beneath the granular base at B-001, fill consisting of stiff silt and clay was encountered to a depth of about 3.5 feet below the ground surface, in-turn underlain by medium stiff sandy silt which extended to the terminal 8-foot boring depth.

Beneath the granular fill layer encountered at boring location B-005, stiff to very stiff silt was encountered. The silt extended to the terminal depth of the boring.

Groundwater

While drilling, groundwater was encountered at the following depths:

Boring No.	Groundwater Encounter (depth / elevation) (feet)
B-001-0-19	None encountered
B-002-0-19	14 / 593
B-003-0-19	8 / 592
B-004-0-19	19.5 / 588
B-005-0-19	None encountered

Immediately following the completion of the drilling operations, water was observed in the structure borings at depths ranging between about 5 and 8 feet below the existing grades. However, these end-of-drilling water levels are not considered be a true reflection of the site's actual groundwater level because water was used during the drilling operations to advance the borings using rotary wash drilling procedures.

ANALYSES AND RECOMMENDATIONS

Based on the evaluation of the subsurface conditions encountered at the boring locations, we recommend that the replacement bridge be supported on a deep foundation system consisting of driven Cast-in-Place (CIP) reinforced concrete pipe piles. The piles will develop their capacities via a combination of end bearing and skin friction/adhesion.

Based on preliminary profile plans provided by Burgess & Niple, we anticipate that approximately 2.5 feet of fill will be required on the west side of the bridge to raise the roadway profile to the proposed grade of the bridge. We recommend using Item 204 Granular Material Type C for the proposed fill. Boring B-001, conducted on this side of the bridge, encountered relatively weak soil with elevated moisture contents directly beneath the pavement. Based on this, we recommend placing a layer of geogrid on the subgrade before placing new fill material on the west side of the bridge. The intent of the geogrid layer is to provide a reinforcing element between the relatively weak existing soils and new fill soils. We recommend the layer of geogrid extend a minimum of 18 inches beyond the edge of the surface of the pavement or paved shoulders. We understand as much as about 6 feet of fill is required for National Park Drive on the west side of the bridge. In this area, we recommend a minimum thickness of about 2.5 feet of Item 204 Granular Material Type C. The remainder of the fill can consist of Item 203 Embankment material.

On the east side of the bridge at boring location B-005, the pavement was found to be underlain by approximately 3 feet of granular fill, which was in-turn underlain by silt. Provided the subgrade conditions encountered in the proposed roadway areas are consistent with those evidenced at this boring location, subgrade stabilization is not expected to be necessary on this side of the bridge.

Recommendations for the design and construction of the driven pile foundations, along with subgrade preparation and earthwork considerations, are offered in the following sections. In addition, shallow bearing foundation recommendations are offered for the design of the low height retaining wall required on the east side of the river, between stations 33+36 and 34+25.

DRIVEN PILE FOUNDATIONS

Driven Piles - Pile Load Resistance

Based on the soil types encountered (fine-grained), we anticipate the soils will experience setup (soil strength gain with time). Thus, the nominal pile resistance will be higher than indicated during driving due to pore pressures that will develop during driving. The effects of soil setup were estimated with a static capacity analysis using ODOT BDM Table 305-1 as guidance for the setup factor (f_{su}). The subsurface soils primarily consist of A-4b and A-6a soils, so a setup factor of 1.5 was used and a reduction factor of 0.67 (1/ f_{su} = 1/1.5 = 0.67) was applied in the static capacity analysis to estimate the resistance during driving and the additional resistance to account for

setup (R_{Ssu}). A reduction factor of 0.83 (1/ f_{su} = 1/1.2 = 0.83) was used for 0 to 10 ft in B-002. The reduction factor was applied to side resistance only.

Piles should be driven to the end of initial drive (EOID) value listed in the table below. Seven (7) days after the initial driving, a re-strike of the piles should be performed to confirm that the Ultimate Bearing Value (UBV) has been achieved. Dynamic testing should be performed during initial driving and re-strikes.

Structure	Nominal Pile Bearing Resistance, R_n (kips) [1]	Factored Downdrag Load, g_pDD (kips) [2]	Additional Side Resistance to Account for Setup, R_{Ssu} (kips) [3]	End of Initial Drive, *EOID* (kips) [4]	Ultimate Bearing Value, *UBV* (kips) [5]	Closed-End Pipe Pile Diameter (inches)	Estimated Pile Tip Depth / Elevation (feet) [6]	Estimated Pile Length (feet) [7]
Rear Abutment	125	--	40	85	125	12	45 / 552	50
Forward Abutment	125	--	40	85	125	12	37 / 560	40
Pier 1	355	--	105	250	355	14	78 / 499	85
Pier 2	355	--	110	245	355	14	75 / 502	80
Temporary Bridge Rear Abutment	240	Front Pile Row: 147 Back Pile Row: 118	60	180	240	14	68 / 537	70
Temporary Bridge Forward Abutment	240	Front Pile Row: 151 Back Pile Row: 120	70	170	240	14	59 / 545	65

1. A resistance factor of 0.7 (φ_{dyn} = 0.7) can be used if dynamic testing is performed. Does not include downdrag load, see discussion in paragraph following table.
2. Calculated based on the Siegel et al. (2013) neutral plane method outlined in Section 7.3.6.1 of GEC 12 and unfactored permanent load provided by Burgess & Niple. Load factor for drag, g_p = 1.40.
3. Based on static capacity analysis using a setup factor f_{su} = 1.5 (with the exception of 1.2 used for B-002-0-19 from 0 to 10 feet)
4. *EOID* = $R_n + R_{Ssc} - R_{Ssu}$ (R_{Ssc}: resistance in scour zone, considered to be 0 kips due to no scour) (BDM C305.3.2-2)
5. *UBV* = *EOID* + R_{Ssu} (BDM C305.3.2-3)
6. Based on static capacity analysis (attached). Depth is from bottom of pile cap elevation. Considers the following bottom of pile cap elevations:

Structure	Nominal Pile Bearing Resistance, R_n (kips) [1]	Factored Downdrag Load, g_pDD (kips) [2]	Additional Side Resistance to Account for Setup, R_{Ssu} (kips) [3]	End of Initial Drive, *EOID* (kips) [4]	Ultimate Bearing Value, *UBV* (kips) [5]	Closed-End Pipe Pile Diameter (inches)	Estimated Pile Tip Depth / Elevation (feet) [6]	Estimated Pile Length (feet) [7]

Rear Abutment: El. 597.08 feet

Forward Abutment: El. 596.94 feet

Pier 1 and 2: El. 577.00 feet

Temporary Bridge Rear Abutment: El. 604.86 feet

Temporary Bridge Forward Abutment: El. 603.83 feet

7. Per BDM Section 305.3.5.2, estimated pile length equal to pile cutoff elevation minus tip elevation rounded to the nearest 5 feet. In instances where rounding adds less than 1-foot, estimated length is increased to the next 5-foot interval.

Fill placement is required for the temporary bridge abutments. As an alternate to waiting for settlement of the foundation soils due to fill placement, downdrag loads can be considered in the pile design. Downdrag loads are provided in the table above and the analysis procedure used is described in the following paragraph. Due to the magnitude of the downdrag loads, we understand the intent is to wait for the settlement of the foundation soils prior to driving the piles. Thus, downdrag loads are not being considered in the current pile design.

As specified in BDM Section 305.3.2.2, downdrag calculations were performed using the Siegel et al. (2013) neutral plane method outlined in Section 7.3.6.1 of Geotechnical Engineering Circular 12 (calculations are attached). Unfactored permanent loads (Q_d) (i.e., unfactored dead loads) required for the downdrag analysis were provided by Burgess & Niple (74 kips for the back pile row and 32 kips for the front pile row). As specified in the 2020 BDM, 100% mobilization of the pile tip resistance was considered in the downdrag analyses. As described in Section 7.3.6.1 of GEC 12, the neutral plane method does not consider the drag force as an additional load to be included in geotechnical resistance; rather, it is to be considered in the pile structural limit state. Therefore, the downdrag force is not included in the nominal bearing resistance (R_n) in the table above.

Settlement of piles due to downdrag is equal to the settlement of the foundation soil at the location of the neutral plane plus the elastic compression of the pile above the location of the neutral plane due to the effects of the permanent load plus the drag load. A summary of estimated settlements is provided in the following table:

Structure and Pile Row	Depth to Neutral Plane	Estimated settlement of foundation soil below neutral plane, inches [1]	Estimated elastic compression of pile above neutral plane, inches [2]	Estimated total settlement due to downdrag, S_{dd}, inches
Temporary Bridge Rear Abutment, Front Pile Row	40 feet	0.6	0.14	0.7
Temporary Bridge Rear Abutment, Back Pile Row	35 feet	0.8	0.14	0.9
Temporary Bridge Forward Abutment, Front Pile Row	29 feet	0.9	0.10	1.0
Temporary Bridge Forward Abutment, Back Pile Row	23 feet	1.2	0.09	1.3

1. From settlement analysis
2. Calculated using elastic compression = QL/AE where:
   Q = Unfactored axial load = Unfactored downdrag load + Unfactored permanent load (139 kips for front pile rows, 157 for rear pile rows)
   L = Depth to neutral plane
   A = Area of pile = 16.05 in^2
   E = Modulus of elasticity = 29,000 ksi

Settlement of individual piles not subject to downdrag is estimated to be less than 1 inch considering that the piles are designed and installed in accordance with ODOT specifications and the recommendations presented in this report. In accordance with AASHTO LRFD Article 10.7.1.2, CIP piles should have a spacing of no closer than 30 inches or 2.5 times the diameter of the pile. This spacing is necessary to minimize group effects for axially loaded piles. The distance from the side of any pile to the nearest edge of the pile cap shall not be less than 9 inches. The top of piles shall project at least 12 inches into the pile cap after all damaged pile material has been removed. The concrete shall have a minimum 28-day compressive strength of 4,000 psi.

Driven Pile Construction Considerations

We have performed preliminary WAVE equation analyses for the recommended 12-inch-diameter and 14-inch-diameter closed-end pipe piles with various wall thickness and for various hammers. For each of the structures and hammers in the following table, the maximum compression and tension stress during driving is below the maximum allowable driving stress ($0.9f_y$ = 31.5 ksi or 40.5 ksi). A summary of the analyses is below.

Structure	Pile Type	Hammer	Blows/ foot	Rated Energy, ER (kip-ft)	Max Compression Stress (ksi)	Max Tension Stress (ksi)
Rear Abutment	12-inch diameter CIP, 1/4-inch wall thickness, 35ksi	DELMAG D 12	28	23	25	1
Forward Abutment	12-inch diameter CIP, 1/4-inch wall thickness, 35ksi	DELMAG D 12	27	23	26	1
Pier 1	14-inch diameter CIP, 1/2-inch wall thickness, 45ksi	DELMAG D 36	31	84	40	3
Pier 2	14-inch diameter CIP, 1/2-inch wall thickness, 45ksi	DELMAG D 36	28	84	40	3
Temporary Bridge Rear Abutment	14-inch diameter CIP, 0.4-inch wall thickness, 35ksi	DELMAG D 22	32	41	29	3
Temporary Bridge Forward Abutment	14-inch diameter CIP, 0.4-inch wall thickness, 35ksi	DELMAG D 22	34	41	29	2

Once the details of the pile-driving system are known, the piling contractor should perform an independent WAVE equation analysis and submit the results to the Engineer or Record for review and approval prior to construction. Piles should be installed according to Item 507 of the most recent ODOT Construction and Material Specifications (CMS). In addition, field dynamic load testing with a pile driving analyzer per ODOT CMS Item 523 is recommended to confirm that the contractor's equipment is imparting the required energy to the piles without causing damage to the piles.

Pile driving may result in slight heave of previously driven piles. To avoid detrimental effects, all piles should be re-tapped prior to the completion of pile driving activities.

Driven Piles for Temporary Bridge

Based on the close proximity of the temporary bridge to the replacement bridge, and the uniformity of the soil conditions encountered, it is our opinion that the pile design recommendations offered above may be used for the design of the piles for the temporary bridge.

As noted in the **INTRODUCTION** section of this report, embankment construction will be needed to achieve the proposed grades of the temporary road that will be built to route traffic, via the

temporary bridge, over the Cuyahoga River, during the construction of the permanent replacement bridge. The embankment will be 8 to 10 feet high at the temporary bridge abutment locations. We estimate that the foundation soils underlying the deepest portions of the embankment could experience up to 1.5 inches of settlement. Two approaches can be taken: wait for the settlement to occur before driving piles or drive the piles before settlement occurs and incorporate downdrag forces in the driven pile design. Due to the magnitude of the downdrag loads, we understand the intent is to wait for substantial completion of the settlement of the foundation soils prior to driving the piles and downdrag loads are not being considered in the current pile design. Therefore, pile driving should be delayed until primary consolidation of the foundation soils is substantially complete as confirmed by a field settlement monitoring program. We recommend a minimum of two (2) settlement platforms behind each abutment at the maximum embankment fill locations. We anticipate 90% consolidation will take place within about 7 days of finishing fill placement.

EXCAVATIONS

All excavations should comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations” and its appendices, as well as other applicable codes.

Groundwater is expected to be encountered when sand and gravel layers are encountered. At structure borings B-002, B-003 and B-004, groundwater was encountered at elevations of about 593, 591.5 and 588 feet, respectively. Groundwater will also be encountered at the river level. Consequently, a dewatering system will be required during construction to maintain dry excavations at the proposed pier locations. Temporary shoring should be used, as necessary, for excavation support and to control groundwater flow into the excavations. Recommendations relative to the design of temporary excavation support and dewatering systems are outside the scope of this study.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

LATERAL EARTH PRESSURE ON ABUTMENTS

The proposed bridge abutments must be designed to withstand lateral earth pressures. To minimize the lateral earth pressures, we recommend that granular material be used for backfill against abutments. The granular backfill should be placed in a wedge formed by the back of the structure and a line rising from the base of the foundations at an angle no greater than 60 degrees from the horizontal. Granular backfill behind the structures should be compacted in accordance with the current ODOT CMS Item 203, Embankment Compaction.

Backwall drainage should also be provided behind the abutments in accordance with ODOT CMS Item 518 "Drainage of Structures", which requires placement of a 2 feet thick layer of porous backfill against the back of the abutment for its full height. The porous backfill against abutments should be drained using a perforated drain pipe at the base of the abutment.

Provided that the abutments are backfilled with properly drained, free-draining granular materials, the lateral earth pressure acting on the structures may be determined using the following soil parameters.

Internal Angle of Friction (ϕ) = 34 degrees
Moist Unit Weight of Backfill (g) = 120 pounds per cubic foot

Provided wall movement equivalent to 0.25 percent of the height of the abutment is allowed to occur, the walls may be designed using an active equivalent fluid pressure of 40 pcf. Abutment walls that do not allow movement should be designed for an at-rest equivalent fluid pressure of 60 pcf.

In addition to the lateral earth pressures, a live load surcharge of 250 psf associated with vehicle traffic should be taken into consideration for determining lateral earth pressures on the bridge abutments.

SCOUR PARAMETERS

Bridges spanning waterways require a scour analysis, which is in part based on the particle size distribution of the soils within the river bed. To obtain soil samples for particle size analysis, we conducted continuous split-barrel soil sampling within the abutment borings from approximately the level of the river bed to a depth of about 6 feet below the river bed.

The soils encountered below the river bed elevation consisted of fine grained, lacustrine deposits of silty clay (A-6a) and silt and clay (A-6b) soils. We selected four soil samples from the borings encountered at or below the river bed elevation for particle size analysis. The D_{50} and D_{95} values of these four samples are noted in the following table:

Boring No.	Sample Depth (feet)	Soil Classification	D_{95} (mm)	D_{50} (mm)
B-002-0-19	24.5 - 26.0	Silty Clay (A-6b)	0.012	0.004
B-003-0-19	14.0 – 15.5	Silty Clay (A-6b)	0.012	0.004
B-003-0-19	17.0 – 18.5	Silt and Clay (A-6a)	0.054	0.004
B-004-0-19	24.5 – 26.0	Clay (A-7-6)	0.008	0.004

Burgess & Niple performed a HEC-RAS scour analysis which resulted in 0.00 feet of scour (report dated July 2019).

RETAINING WALL

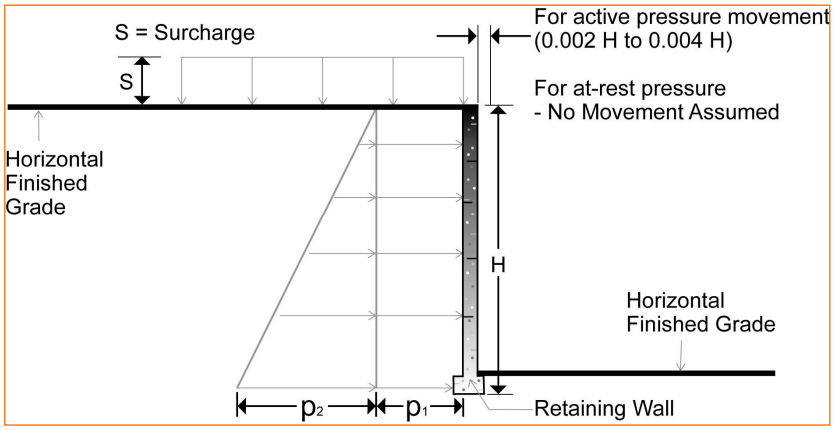
A retaining wall will be required on the south side of Old Rockside Road, east of the Cuyahoga River to accommodate the grade difference between the new roadway and the adjacent Thornburg Station parking lot. The retaining wall is located from approximately Sta. 33+36 to Sta. 34+25. The wall be cast-in-place concrete cantilever with a shallow spread footing foundation.

Based on the assumption that the soils at the proposed retaining wall location are similar to those in test boring B-004, the foundations may be designed using a nominal bearing resistance of 5,393 psf for the undrained case and 4,776 psf for the drained case. Using a bearing resistance factor, φ_b, of 0.55, the factored bearing resistance is 2,966 psf for the undrained case and 2,627 psf for the drained case. The strength limit state factored bearing pressure is 2,580 psf (provided by Burgess and Niple). This results in a capacity-demand ratio (CDR) of 1.15 for the undrained case and 1.02 for the drained case (CDR>1 is acceptable). These bearing resistances consider an effective footing width of 3 feet (provided by Burgess and Niple).

For frost protection, the foundations should bear at a depth of at least 3.5 feet below the ground level on the downhill side of the wall. Based on the results of test boring B-004, we anticipate that stiff or better consistency soil will be encountered at the planned foundation bearing elevation of the wall. However, should soft or otherwise unsuitable materials be encountered at the planned foundation bearing elevation, the foundation excavations should be stepped down to suitable soil. The footings could bear directly on these soils at the lower level or on low strength concrete backfill extending from the base of the excavation to the foundation bearing elevation.

Provided the foundation is placed on at least 6 inches of granular material over the clay, a nominal sliding resistance equal to 0.5 times the normal stress may be used for the interface between the footing and the soil. The factored sliding resistance would be equal to the nominal sliding resistance times the sliding resistance factor of 0.85. We recommend the use of a moist unit weight of 120 pcf for the backfill materials.

Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The “at-rest” condition assumes no wall movement and is commonly used for walls restrained at the top. The recommended design lateral earth pressures are unfactored.



Lateral Earth Pressure Design Parameters			
Earth Pressure Condition [1]	**Coefficient for Backfill Type** [2]	**Surcharge Pressure** [3, 4] **p_1 (psf)**	**Effective Fluid Pressures** [2, 4, 5] **p_2 (psf)**
Active (Ka)	Granular - 0.28	(0.28)S	(34)H
At-Rest (Ko)	Granular - 0.44	(0.44)S	(53)H
Passive (Kp)	Fine Grained - 2.66	---	(320)H

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.01 H for cohesive soils and 0.005 H for granular soils, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
2. Uniform, horizontal backfill, compacted to at least 95% of the ASTM D 698 maximum dry density, rendering a maximum unit weight of 120 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. Passive pressure should be ignored above the frost zone.

Backfill placed against the retaining wall should consist of granular soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 degrees from vertical for the active and at-rest case.

SLOPE STABILITY

Mechanics of Stability

Slope stability analyses take into consideration material strength, presence and orientation of weak layers, water (piezometric) pressures, surcharge loads, and the slope geometry. Mathematical computations are performed using computer-assisted simulations to calculate a Factor of Safety (FS). Reasonable FS values are dependent upon the confidence in the parameters utilized in the analyses performed, among other factors related to the project itself.

Inputs and Parameters

Slope stability analyses were performed at Sta. 33+36.00 (Sheet No. 55/157). Subsurface data for the analysis was from Test Boring B-004-0-19. Slope stability analysis parameters were primarily selected based on Tables 1 and 2 from ODOT Geotechnical Bulletin Number 7 as well as laboratory testing and experience. A groundwater table (piezometric level) was modeled at El. 600. A traffic surcharge of 250 psf on the roadway was included in the analysis. Stability analyses were conducted using the computer program GeoStudio Slope/W developed by Seequent.

Soil properties used in the analyses are shown below:

Material	Moist Unit Weight (pcf)	Drained		Undrained	
		Cohesion (psf)	Friction Angle (degrees)	Cohesion (psf)	Friction Angle (degrees)
Very Stiff Sandy Silt, A-4a (El. 601 to 606 feet)	120	100	22	1,500	--
Loose Coarse and Fine Sand, A-3a (El. 600 to 601 feet)	120	--	28	--	28
Stiff Silt and Clay, A-6a (El. 588 to 600 feet)	120	75	20	1,000	--

Results

Slope stability analyses were performed for short-term (undrained) and long-term (drained) conditions. Based on the analyses, the calculated factor of safety for the critical surface in each case is shown in the table below.

Condition	Minimum Calculated Factor-of-Safety
Long-Term (drained)	2.8
Short-Term (undrained)	8.4

The ODOT Bridge Design Manual Section 307.1.2 specifies a minimum factor of safety for global slope stability of 1.5 for retaining walls that support other structures. The minimum factor-of-safety for global stability at the cross sections analyzed is greater than required 1.5. Therefore, the retaining wall is acceptable in terms of global slope stability.

ROADWAY APPROACHES

Subgrade Analysis and Stabilization

Based on the test borings and GB-1 analysis (attached), global stabilization or undercutting is not required for this project. However, areas where the subgrade soils have deteriorated due to trafficking or water-softening may require an undercut and replacement to provide a suitable surface for structural fill placement.

Based on preliminary profile plans provided by Burgess & Niple, we anticipate that approximately 2.5 feet of fill will be required on the west side of the bridge to raise the roadway profile to the proposed grade of the bridge. We recommend using Item 204 Granular Material Type C for the proposed fill. Boring B-001, conducted on this side of the bridge, encountered relatively weak soil with elevated moisture contents directly beneath the pavement. Based on this, we recommend placing a layer of geogrid on the subgrade before placing new fill material on the west side of the bridge. The intent of the geogrid layer is to provide a reinforcing element between the relatively weak existing soils and new fill soils. We recommend the layer of geogrid extend a minimum of 18 inches beyond the edge of the surface of the pavement or paved shoulders. We understand as much as about 6 feet of fill is required for National Park Drive on the west side of the bridge. In this area, we recommend a minimum thickness of about 2.5 feet of Item 204 Granular Material Type C. The remainder of the fill can consist of Item 203 Embankment material.

On the east side of the bridge at boring location B-005, the pavement was found to be underlain by approximately 3 feet of granular fill, which was in-turn underlain by silt. Provided the subgrade conditions encountered in the proposed roadway areas are consistent with those evidenced at this boring location, subgrade stabilization is not expected to be necessary.

Removal of existing asphalt pavement will be required. Unless otherwise specified by the construction plans, removal and abandonment of existing pavement within the construction area should be in accordance with the specifications of Item 202 of the current ODOT CMS. In addition to removing the existing pavement, as well as any other structural interferences, all topsoil and significant root matrix should be stripped and removed from the proposed roadway areas that fall outside of the existing pavement areas.

Roadway excavation and embankment construction should be performed in accordance with the specifications of Item 203 of the current ODOT CMS.

All fill materials proposed for embankment construction should be tested and approved prior to use and should be compacted to a density that is not less than the specified percentage of maximum dry density outlined in ODOT CMS Item 203.07.

Subgrade Design Parameters

Laboratory California Bearing Ratio (CBR) testing was not performed on the anticipated subgrade soils for this project. Thus, the CBR value has been estimated based on correlations between the soil's index properties and CBR developed by ODOT and outlined in their Pavement Design and Rehabilitation Manual. Presuming that the predominant subgrade soils will consist of silt and clay (ODOT A-6a), we recommend that a design CBR value of 6 be used for pavement design. A CBR value of 6 corresponds to a subgrade resilient modulus of 7,200 psi according to the ODOT pavement design guidelines. Our recommended CBR value of 6 is lower than the CBR value calculated using ODOT's Geotechnical Bulletin GB-1 spreadsheet. We based our recommended CBR value instead on correlations between the soil's CBR value, group index and AASHTO Classification, contained in ODOT's Pavement Design and Rehabilitation Manual.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site

characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

Old Rockside Road Bridge Replacement ■ Valley View, OH
April 27, 2020 ■ Terracon Project No. N6175053

Terracon GeoReport

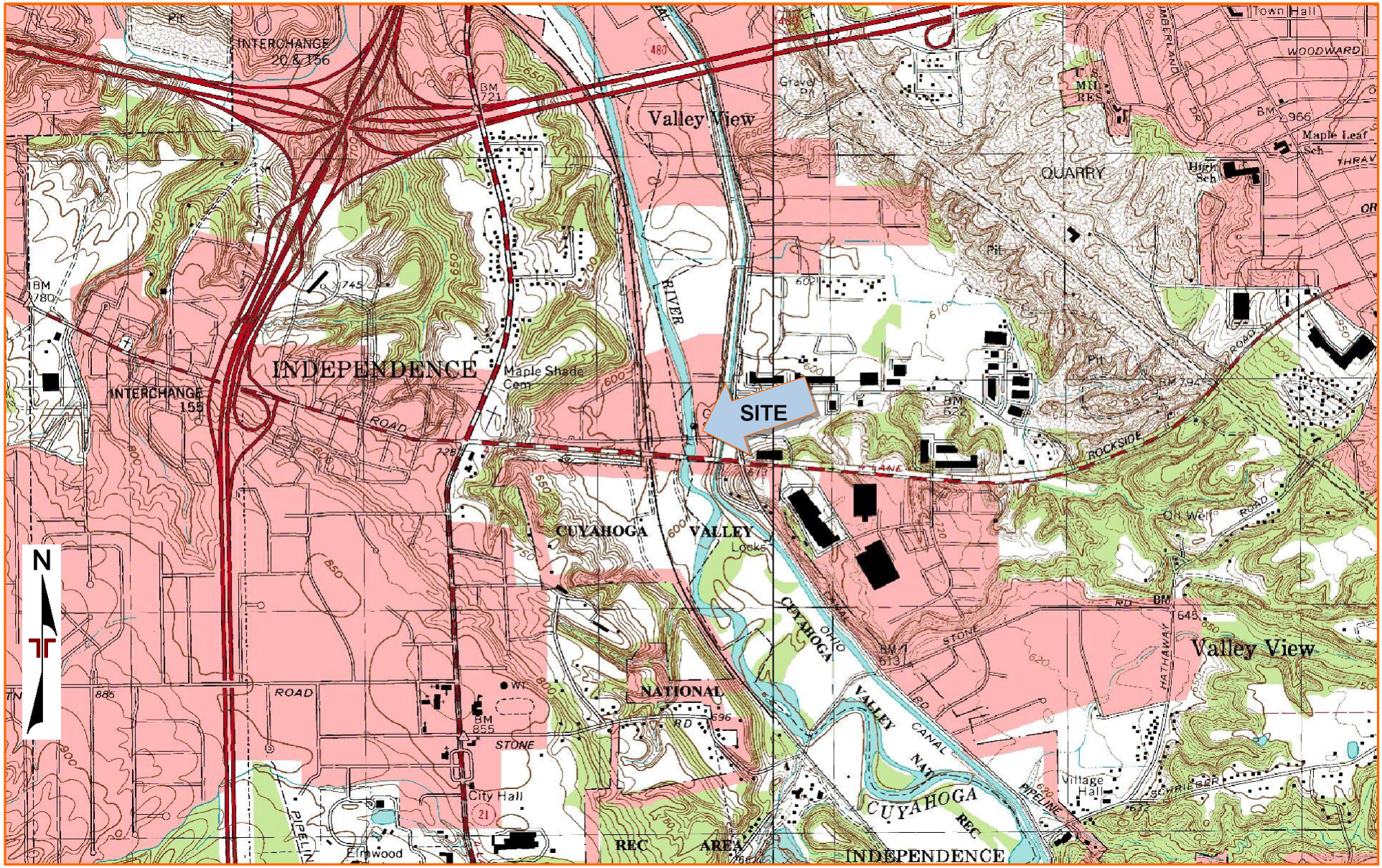


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: CLEVELAND SOUTH, OH (1/1/1994) and SHAKER HEIGHTS, OH (1/1/1994).

EXPLORATION PLAN

Old Rockside Road Bridge Replacement ■ Valley View, OH
April 27, 2020 ■ Terracon Project No. N6175053

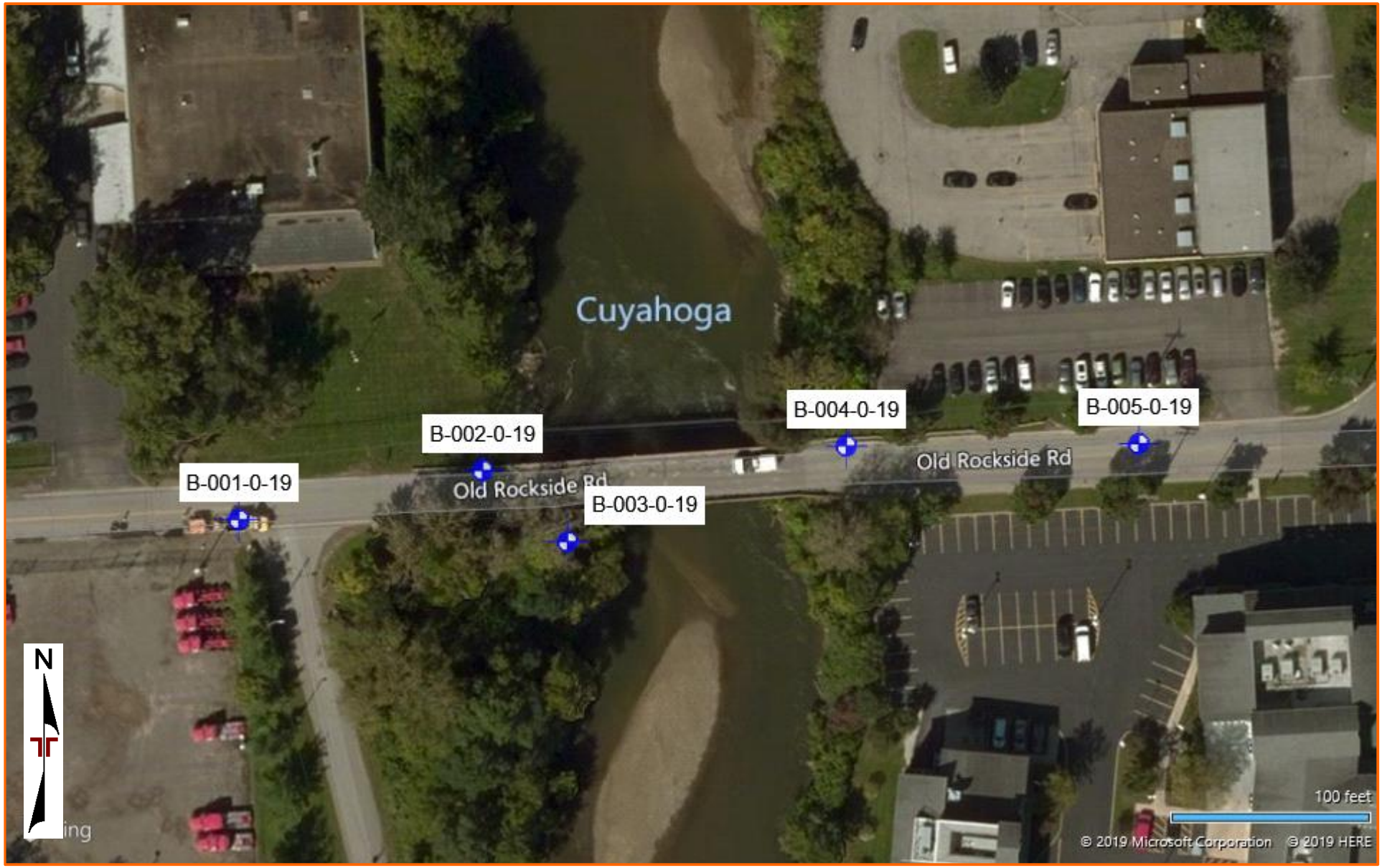


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-001 through B-005, Historic Boring Log C-20)
Unconsolidated-Undrained Test (7 pages)

Note: All attachments are one page unless noted above.

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / FAY	DRILL RIG: B-57 TRUCK	STATION / OFFSET: 29+64, 10' RT.
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: OTB / FAY	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 600.9 (MSL) EOB: 8.0 ft.
START: 5/15/19 END: 5/15/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 41.394550, -81.630060

EXPLORATION ID B-001-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV. 600.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT (16")	599.6	1																
GRAVEL BASE (4")	599.2																	
STIFF, BROWN, **SILT AND CLAY**, SOME SAND, (FILL), MOIST	597.4	2	2 2 2	6	78	SS-1	1.75	0	2	23	48	27	28	17	11	21	A-6a (8)	
MEDIUM STIFF, BROWN, **SANDY SILT**, LITTLE CLAY, (POSSIBLE FILL), MOIST TO WET		3	1 1 2	5	67	SS-2	0.75	-	-	-	-	-	-	-	-	28	A-4a (V)	
		4	1 1 1	3	100	SS-3	1.00	0	0	39	43	18	24	18	6	26	A-4a (5)	
	592.9	5	1 1 1	3	100	SS-4	0.75	-	-	-	-	-	-	-	-	33	A-4a (V)	
		EOB 6																
		7																
		8																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTIINGS WITH ASPHALT PATCH

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / FAY	DRILL RIG: B-57 TRUCK	STATION / OFFSET: 30+88, 9' LT.	EXPLORATION ID B-002-0-19
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: OTB / FAY	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE	
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 607.0 (MSL) EOB: 120.0 ft.	PAGE 1 OF 5
START: 5/14/19 END: 5/17/19	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 90*	LAT / LONG: 41.394620, -81.629100	

MATERIAL DESCRIPTION AND NOTES	ELEV. 607.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT (12")	606.0	1																
LIMESTONE BASE (12")	605.0																	
HARD, GREENISH BROWN TO BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS BRICK, ASPHALT, (FILL), DAMP	603.7	2	9 5 6	17	78	SS-1	4.50	-	-	-	-	-	-	-	-	13	A-6a (V)	
STIFF TO VERY STIFF, DARK BROWN, **SANDY SILT**, SOME CLAY, TRACE GRAVEL, (FILL), MOIST		3																
		4	5 7 5	18	100	SS-2	3.75	9	2	29	40	20	27	19	8	19	A-4a (5)	
		5 ▼																
		6																
		7	2 1 1	3	44	SS-3	1.00	-	-	-	-	-	-	-	-	16	A-4a (V)	
@8.0'; BROWN, SOME CLAY, DAMP		8																
		9	2 5 3	12	100	SS-4	-	-	-	-	-	-	-	-	-	16	A-4a (V)	
	596.5	10																
VERY LOOSE TO LOOSE, BROWN, **SANDY SILT**, LITTLE CLAY, MOIST TO WET		11																
		12	1 2 2	6	89	SS-5	-	0	0	41	43	16	NP	NP	NP	20	A-4a (5)	
		13																
		W 593.0 14	2 1 1	3	100	SS-6	-	-	-	-	-	-	-	-	-	25	A-4a (V)	
	591.5	15																
VERY LOOSE TO LOOSE, BROWN, **FINE SAND**, SOME COARSE SAND, TRACE GRAVEL, TRACE SILT, WET		16																
		17	1 1 1	3	100	SS-7	-	-	-	-	-	-	-	-	-	27	A-3 (V)	
		18																
		19	1 1 3	6	56	SS-8	-	-	-	-	-	-	-	-	-	22	A-3 (V)	
		20	2 2 2	6	67	SS-9	-	5	25	61	6	3	NP	NP	NP	26	A-3 (0)	
	585.5	21																
MEDIUM DENSE, OLIVE-GRAY, **GRAVEL AND/OR STONE FRAGMENTS**, SOME SAND, TRACE SILT, WET	584.0	22	3 4 8	18	72	SS-10	-	67	12	11	8	2	NP	NP	NP	13	A-1-a (0)	
STIFF, GRAY, **SILTY CLAY**, MOIST		23																
		24	4 2 2	6	33	SS-11	1.50	-	-	-	-	-	-	-	-	36	A-6b (V)	
		25	2 3 4	11	83	SS-12	1.75	0	1	1	30	68	36	20	16	26	A-6b (10)	
		26																
		27	3 3 5	12	100	SS-13	1.25	-	-	-	-	-	-	-	-	25	A-6b (V)	
	579.0																	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 30+88, 9' LT.	START: 5/14/19	END: 5/17/19	PG 2 OF 5	B-002-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF TO VERY STIFF, GRAY, **SANDY SILT**, MOIST	579.0	29	2 3 4	11	100	SS-14	2.00	-	-	-	-	-	-	-	-	25	A-4a (V)	
@31.0'; UU TEST RESULTS - SAMPLE DEPTH 31.0-33.0 FEET QU = 1.45 TSF, DRY DENSITY = 104.4 PCF, CELL PRESSURE = 0.87 TSF		30 31 32			100	ST-15	-	1	0	1	39	59	27	21	6	26	A-4a (8)	
		33 34	3 3 4	11	100	SS-16	2.50	-	-	-	-	-	-	-	-	29	A-4a (V)	
	570.0	35 36 37 38																
STIFF TO VERY STIFF, GRAY, **SILT**, SOME CLAY, MOIST		39	2 2 4	9	83	SS-17	2.25	1	0	0	72	27	26	22	4	26	A-4b (8)	
		40 41 42 43																
		44	2 3 3	9	100	SS-18	0.50	-	-	-	-	-	-	-	-	28	A-4b (V)	
		45 46 47 48																
		49	2 3 3	9	100	SS-19	1.25	1	1	3	- 95 -		23	21	2	28	A-4 (8)	
	555.0	50 51 52 53																
MEDIUM STIFF TO STIFF, GRAY, **SANDY SILT**, MOIST		54	2 3 3	9	100	SS-20	1.00	-	-	-	-	-	-	-	-	22	A-4a (V)	
		55 56 57																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 30+88, 9' LT.	START: 5/14/19	END: 5/17/19	PG 3 OF 5	B-002-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
MEDIUM STIFF TO STIFF, GRAY, **SANDY SILT**, MOIST *(continued)*	549.0	59	2 3 3	9	100	SS-21	1.25	-	-	-	-	-	-	-	-	23	A-4a (V)	
		60																
		61																
		62																
		63																
		64	2 3 4	11	100	SS-22	0.50	0	0	0	40	60	33	23	10	30	A-4a (8)	
		65																
	541.0	66																
VERY STIFF, GRAY, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, MOIST		67																
		68																
		69	3 5 7	18	100	SS-23	2.00	-	-	-	-	-	-	-	-	19	A-6a (V)	
		70																
		71																
@71.0'; NO SAMPLE RECOVERY IN THE SHELBY TUBE PUSHED FROM A DEPTH OF 71 TO 73 FEET		72			0	ST-24	-	-	-	-	-	-	-	-	-	-		
		73																
		74	4 4 9	20	100	SS-25	2.00	7	3	5	44	41	28	17	11	19	A-6a (8)	
		75																
		76																
		77																
		78																
		79	4 6 10	24	100	SS-26	2.75	-	-	-	-	-	-	-	-	18	A-6a (V)	
		80																
		81																
	525.0	82																
STIFF TO HARD, GRAY, **SANDY SILT**, MOIST		83																
		84			100	SS-27	4.00	-	-	-	-	-	-	-	-	17	A-4a (V)	
		85																
		86																
		87																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 30+88, 9' LT.	START: 5/14/19	END: 5/17/19	PG 4 OF 5	B-002-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF TO HARD, GRAY, **SANDY SILT**, MOIST *(continued)*	519.0																	
		89	7 11 12	35	100	SS-28	3.75	3	2	5	47	43	28	18	10	16	A-4a (8)	
		90																
		91																
		92																
		93																
		94	7 11 16	41	100	SS-29	4.50	-	-	-	-	-	-	-	-	16	A-4a (V)	
		95																
		96																
		97																
		98																
@98.5'; NO SAMPLE RECOVERY IN THE SPLIT-BARREL FROM A DEPTH OF 98.5 TO 100 FEET		99	6 8 10	27	0	SS-30	-	-	-	-	-	-	-	-	-	-		
		100																
		101																
		102																
		103																
		104	8 10 11	32	33	SS-31	1.50	0	1	1	48	50	29	19	10	30	A-4a (8)	
		105																
		106																
		107																
	499.0	108																
STIFF, GRAY, **SILTY CLAY**, MOIST		109	4 5 6	17	39	SS-32	1.25	-	-	-	-	-	-	-	-	28	A-6b (V)	
		110																
		111																
		112																
		113																
		114	4 5 6	17	100	SS-33	1.25	-	-	-	-	-	-	-	-	27	A-6b (V)	
		115																
		116																
		117																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 30+88, 9' LT.	START: 5/14/19	END: 5/17/19	PG 5 OF 5	B-002-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF, GRAY, **SILTY CLAY**, MOIST *(continued)*	489.0																	
	487.0	119	3 5 5	15	100	SS-34	1.00	0	0	0	34	66	39	20	19	30	A-6b (12)	
		EOB 120																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PUMPED 2 BAG SEALED WITH PORTLAND CEMENT AND BENTONITE GROUT

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / HEPNER	DRILL RIG: B-57 TRACK	STATION / OFFSET: 31+09, 34' RT.	EXPLORATION ID B-003-0-19
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: OTB / HEPNER	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE	
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 599.6 (MSL) EOB: 120.0 ft.	PAGE 1 OF 5
START: 5/20/19 END: 5/20/19	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 90*	LAT / LONG: 41.394500, -81.629530	

MATERIAL DESCRIPTION AND NOTES	ELEV. 599.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
TOPSOIL (12")	598.6																	
MEDIUM STIFF TO STIFF, BROWN, **SANDY SILT**, CONTAINS ROOTLETS, MOIST		1	1 2 2	6	72	SS-1	2.75	-	-	-	-	-	-	-	-	24	A-4a (V)	
		2																
		3																
		4	1 1 1	3	94	SS-2	1.75	2	2	36	43	17	25	20	5	20	A-4a (5)	
		5																
		6																
		7	1 1 1	3	94	SS-3A	0.75	-	-	-	-	-	-	-	-	27	A-4a (V)	
	591.6					SS-3B	2.00	-	-	-	-	-	-	-	-	38	A-4a (V)	
VERY LOOSE, DARK GRAY, **COARSE AND FINE SAND**, SOME GRAVEL, LITTLE SILT, WET		W 591.6 8																
		9	1 0 1	2	72	SS-4	-	22	21	38	14	5	NP	NP	NP	39	A-3a (0)	
	589.1	10																
MEDIUM DENSE, GRAY, **GRAVEL WITH SAND**, TRACE SILT, WET		11																
	587.1	12	4 6 2	12	17	SS-5	-	-	-	-	-	-	-	-	-	15	A-1-b (V)	
STIFF, GRAY, **SILTY CLAY**, MOIST		13	1 2 4	9	83	SS-6	1.25	-	-	-	-	-	-	-	-	26	A-6b (V)	
		14																
		15	3 4 5	14	94	SS-7	2.00	0	1	1	31	67	39	21	18	25	A-6b (11)	
	582.6	16	3 4 6	15	94		-	-	-	-	-	-	-	-	-	-		
STIFF, GRAY, **SILT AND CLAY**, MOIST		17																
		18	2 4 4	12	100	SS-9	2.00	0	0	0	37	63	35	21	14	24	A-6a (10)	
		19	2 4 5	14	94	SS-10	1.75	-	-	-	-	-	-	-	-	28	A-6a (V)	
		20																
		21																
		22	2 3 4	11	94	SS-11	1.25	-	-	-	-	-	-	-	-	29	A-6a (V)	
		23																
		24	2 3 5	12	100	SS-12	1.25	-	-	-	-	-	-	-	-	24	A-6a (V)	
		25																
		26																
		27	4 6 6	18	83	SS-13	1.25	-	-	-	-	-	-	-	-	24	A-6a (V)	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 31+09, 34' RT.	START: 5/20/19	END: 5/20/19	PG 2 OF 5	B-003-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF, GRAY, **SILT AND CLAY**, MOIST *(continued)*	571.6																	
		29	3 4 5	14	89	SS-14	1.00	0	0	0	50	50	31	20	11	26	A-6a (8)	
	569.1	30																
MEDIUM STIFF TO VERY STIFF, GRAY, **SILT**, LITTLE TO SOME SILT, MOIST @31.0'; UU TEST RESULTS - SAMPLE DEPTH 31.0 TO 33.5 FEET, QU = 3.61 TSF, DRY DENSITY = 112.8 PCF, CELL PRESSURE = 1.3 TSF		31																
		32			100	ST-15	-	0	0	1	81	18	24	20	4	22	A-4b (8)	
		33																
		34	3 4 6	15	94	SS-16	1.00	-	-	-	-	-	-	-	-	24	A-4b (V)	
		35																
		36																
		37																
		38																
		39	3 4 4	12	94	SS-17	-	0	0	1	75	24	24	20	4	27	A-4b (8)	
		40																
		41																
		42																
		43																
		44	2 2 2	6	100	SS-18	-	-	-	-	-	-	-	-	-	22	A-4b (V)	
		45																
		46																
		47																
		48																
		49	2 3 3	9	94	SS-19	0.50	0	0	0	63	37	26	19	7	22	A-4b (8)	
	548.6	50																
MEDIUM STIFF, GRAY, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, MOIST		51																
		52																
		53																
		54	4 5 5	15	100	SS-20	0.50	-	-	-	-	-	-	-	-	28	A-6a (V)	
		55																
		56																
	542.9	57																
STIFF, GRAY, **SILT AND CLAY**, MOIST																		

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 31+09, 34' RT.	START: 5/20/19	END: 5/20/19	PG 3 OF 5	B-003-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF, GRAY, **SILT AND CLAY**, MOIST *(continued)* @58.5'; UU TEST RESULTS - SAMPLE DEPTH 58.5 TO 60.5 FEET, QU = 1.81 TSF, DRY DENSITY = 106.3 PCF, CELL PRESSURE = 2.25 TSF	541.6	59 60 61 62 63			100	ST-21	-	-	-	-	-	-	-	-	-	-	A-6a (V)	
		64 65 66	3 4 4	12	100	SS-22	1.25	5	1	3	35	56	34	19	15	27	A-6a (10)	
VERY STIFF, GRAY, **SILT AND CLAY**, TRACE SAND, MOIST	532.6	67 68 69	4 7 11	27	100	SS-23	2.75	-	-	-	-	-	-	-	-	17	A-6a (V)	
		70 71 72 73 74	5 9 13	33	94	SS-24	3.25	-	-	-	-	-	-	-	-	16	A-6a (V)	
VERY STIFF TO HARD, GRAY, **SANDY SILT**, MOIST	524.6	75 76 77 78 79	6 10 13	35	94	SS-25	4.00	2	4	5	47	42	27	18	9	16	A-4a (8)	
@83.5'; UU TEST RESULTS - SAMPLE DEPTH 83.5 TO 85.5 FEET, QU = 5.3 TSF, DRY DENSITY = 119.2 PCF, CELL PRESSURE = 3.05 TSF		80 81 82 83 84 85			-	ST-26	-	-	-	-	-	-	-	-	-	-	A-4a (V)	
STIFF TO VERY STIFF, GRAY, **SILT**, MOIST	512.6	86 87																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 31+09, 34' RT.	START: 5/20/19	END: 5/20/19	PG 4 OF 5	B-003-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF TO VERY STIFF, GRAY, **SILT**, MOIST *(continued)*	511.6	89	5 8 12	30	94	SS-27	1.50	-	-	-	-	-	-	-	-	24	A-4b (V)	
		90																
		91																
		92																
		93																
		94	5 7 10	26	100	SS-28	2.50	0	0	0	53	47	-	-	-	20	A-4b (V)	
		95																
	503.6	96																
STIFF TO VERY STIFF, GRAY, **SILT AND CLAY**, MOIST		97																
		98																
		99	3 5 5	15	100	SS-29	1.25	-	-	-	-	-	28	19	9	26	A-6a (V)	
		100																
		101																
		102																
		103																
		104	2 4 6	15	100	SS-30	1.00	0	0	0	36	64	36	21	15	27	A-6a (10)	
		105																
		106																
		107																
		108																
		109	3 5 5	15	100	SS-31	1.00	-	-	-	-	-	-	-	-	26	A-6a (V)	
		110																
		111																
		112																
		113																
	486.6	114	3 6 6	18	100	SS-32	0.50	-	-	-	-	-	-	-	-	29	A-4b(V)	
MEDIUM STIFF, GRAY, **SILT**, LITTLE CLAY, WET		115																
		116																
		117																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 31+09, 34' RT.	START: 5/20/19	END: 5/20/19	PG 5 OF 5	B-003-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
MEDIUM STIFF, GRAY, **SILT**, LITTLE CLAY, WET *(continued)*	481.7																	
	479.6	119	5 5 6	17	100	SS-33	-	0	0	1	82	17	22	20	2	27	A-4b (8)	
		EOB 120																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PUMPED 2 BAG SEALED WITH PORTLAND CEMENT AND BENTONITE GROUT

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / FAY	DRILL RIG: B-57 TRUCK	STATION / OFFSET: 32+12, 10' LT.	EXPLORATION ID B-004-0-19
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: OTB / FAY	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE	
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 607.7 (MSL) EOB: 110.0 ft.	PAGE 1 OF 4
START: 5/20/19 END: 5/21/19	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 90*	LAT / LONG: 41.391650, -81.628950	

MATERIAL DESCRIPTION AND NOTES	ELEV. 607.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
ASPHALT (8")	607.0																	
LIMESTONE BASE (8")	606.4																	
MEDIUM DENSE, BROWN, **COARSE AND FINE SAND**, SOME GRAVEL, LITTLE SILT, (PROBABLE FILL), DAMP	605.7		9 6 4	15	100	SS-1A	-	-	-	-	-	-	-	-	-	7	A-3a (V)	
						SS-1B	3.75	11	6	24	36	23	23	15	8	14	A-4a (5)	
VERY STIFF, BROWN, **SANDY SILT**, LITTLE GRAVEL, (PROBABLE FILL), DAMP @3.5'; STIFF, CONTAINS SAND SEAMS			3 2 2	6	56	SS-2	1.50	-	-	-	-	-	-	-	-	15	A-4a (V)	
	601.0		2 2 2	6	67	SS-3A	1.25	-	-	-	-	-	-	-	-	24	A-4a (V)	
LOOSE, LIGHT BROWN, **COARSE AND FINE SAND**, SOME STONE FRAGMENTS, TRACE SILT, (PROBABLE FILL), DAMP	599.7					SS-3B	-	-	-	-	-	-	-	-	-	7	A-3a (V)	
STIFF, BROWN, **SILT AND CLAY**, TRACE COAL FRAGMENTS, TRACE TO LITTLE SAND, (PROBABLE FILL), DAMP			2 1 1	3	67	SS-4	1.25	-	-	-	-	-	-	-	-	22	A-6a (V)	
			2 3 3	9	78	SS-5	1.50	24	0	20	40	16	35	23	12	23	A-6a (5)	
			1 1 2	5	100	SS-6	1.00	0	0	6	- 94 -		38	23	15	31	A-6a (10)	
	591.0		1 2 2	6	100	SS-7A	1.50	-	-	-	-	-	-	-	-	32	A-6a (V)	
SOFT TO MEDIUM STIFF, DARK GRAY, **SANDY SILT**, MODERATELY ORGANIC, CONTAINS WOOD, (POSSIBLE FILL), WET						SS-7B	-	-	-	-	-	-	-	-	-	-	A-4a (V)	
		W 588.2	1 1 1	3	100	SS-8	0.50	-	-	-	-	-	-	-	-	29	A-4a (V)	
	587.2																	
LOOSE TO MEDIUM DENSE, BROWNISH GRAY, **GRAVEL WITH SAND**, LITTLE SILT, WET			2 3 4	11	89	SS-9	-	-	-	-	-	-	-	-	-	12	A-1-a (V)	
	583.7		5 2 3	8	39	SS-10	-	54	13	18	11	4	NP	NP	NP	9	A-1-b (0)	
MEDIUM STIFF TO STIFF, GRAY, **CLAY**, LITTLE SILT, WET			4 2 2	6	33	SS-11	0.50	-	-	-	-	-	-	-	-	32	A-7-6 (V)	
			2 3 3	9	100	SS-12	1.25	0	0	2	18	80	42	23	19	29	A-7-6 (12)	
			2 3	9	100	SS-13	1.25	-	-	-	-	-	-	-	-	31	A-7-6 (V)	

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 32+12, 10' LT.	START: 5/20/19	END: 5/21/19	PG 2 OF 4	B-004-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
MEDIUM STIFF TO STIFF, GRAY, **CLAY**, LITTLE SILT, WET *(continued)*	579.7		3															
		29	2 3 4	11	100	SS-14	1.00	-	-	-	-	-	-	-	-	30	A-7-6 (V)	
	577.2	30																
MEDIUM STIFF TO STIFF, GRAY, **SILT AND CLAY**, MOIST @31.0'; UU TEST RESULTS - SAMPLE DEPTH 31.0 TO 33.5 FEET, QU = 1.08 TSF, DRY DENSITY = 101.7 PCF, CELL PRESSURE = 1.5 TSF		31																
		32			63	ST-15	1.25	0	0	1	43	56	31	20	11	29	A-6a (8)	
		33																
		34	2 2 3	8	83	SS-16	0.50	-	-	-	-	-	-	-	-	29	A-6a (V)	
	570.7	35																
MEDIUM STIFF TO STIFF, GRAY, **SILT**, AND CLAY, MOIST		36																
		37																
		38																
		39	1 2 3	8	100	SS-17	1.25	1	0	0	56	43	28	21	7	25	A-4b (8)	
		40																
@41.0'; UU TEST RESULTS - SAMPLE DEPTH 41.0 TO 43.0 FEET, QU = 1.13 TSF, DRY DENSITY = 106.7 PCF, CELL PRESSURE = 1.84 TSF		41																
		42			-	ST-18	-	0	1	1	61	37	23	20	3	26	A-4b (8)	
		43																
		44	2 3 5	12	100	SS-19	0.50	-	-	-	-	-	-	-	-	28	A-4b (V)	
	561.0	45																
MEDIUM STIFF, GRAY, **SILT AND CLAY**, MOIST		46																
		47																
		48																
		49	2 2 2	6	100	SS-20	-	0	0	0	-100-		29	18	11	24	A-6a (8)	
		50																
		51																
		52																
		53																
		54	2 4 4	12	100	SS-21	-	-	-	-	-	-	-	-	-	20	A-6a (V)	
	551.0	55																
MEDIUM STIFF, GRAY, **SILTY CLAY**, MOIST TO WET		56																
		57																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 32+12, 10' LT.	START: 5/20/19	END: 5/21/19	PG 3 OF 4	B-004-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
MEDIUM STIFF, GRAY, **SILTY CLAY**, MOIST TO WET *(continued)*	549.7	59	5 5 6	17	83	SS-22	0.50	0	0	1	30	69	38	20	18	25	A-6b (11)	
		60																
		61																
		62																
		63																
		64	4 6 4	15	100	SS-23	0.50	-	-	-	-	-	-	-	-	27	A-6b (V)	
		65																
		66																
		67																
		68																
		69	4 5 5	15	100	SS-24	0.50	-	-	-	-	-	-	-	-	28	A-6b (V)	
	537.5	70																
VERY STIFF, GRAY, **SANDY SILT**, SOME CLAY, MOIST		71																
@71.0'; UU TEST RESULTS - SAMPLE DEPTH 71.0 TO 73.0 FEET, QU = 1.69 TSF, DRY DENSITY = 107.7 PCF, CELL PRESSURE = 2.7 TSF		72			96	ST-25	-	2	15	7	35	41	26	18	8	23	A-4a (8)	
	534.2	73																
STIFF, GRAY, **SANDY SILT**, MOIST		74	4 4 7	17	100	SS-26	0.75	1	0	0	46	53	-	-	-	31	A-4b (V)	
		75																
		76																
	530.7	77																
STIFF, GRAY, **SILTY CLAY**, MOIST		78																
		79	5 10 14	36	67	SS-27	2.00	-	-	-	-	-	32	23	9	20	A-6b (V)	
		80																
		81																
		82																
		83																
		84	5 10 13	35	100	SS-28	1.75	-	-	-	-	-	-	-	-	18	A-6b (V)	
		85																
		86																
	520.7	87																

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563	SFN:	PROJECT: OLD ROCKSIDE ROAD	STATION / OFFSET: 32+12, 10' LT.	START: 5/20/19	END: 5/21/19	PG 4 OF 4	B-004-0-19

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
VERY STIFF TO HARD, GRAY, **SILT AND CLAY**, TRACE SAND, MOIST *(continued)*	519.7	89	6 10 15	38	100	SS-29	2.00	2	3	5	45	45	29	17	12	18	A-6a (9)	
		90																
		91																
		92																
		93																
		94	5 11 17	42	100	SS-30	3.00	-	-	-	-	-	-	-	-	17	A-6b (V)	
		95																
		96																
		97																
		98																
		99	10 20 29	74	100	SS-31	4.25	4	4	5	46	41	28	17	11	15	A-6a (8)	
		100																
		101																
		102																
		103																
		104	9 17 22	59	100	SS-32	3.50	-	-	-	-	-	-	-	-	16	A-6b (V)	
		105																
		106																
		107																
		108																
		109	8 17 24	62	100	SS-33	2.25	5	3	5	44	43	28	17	11	19	A-6a (8)	
	497.7	EOB 110																

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PUMPED 2 BAGS SEALED WITH PORTLAND CEMENT AND BENTONITE GROUT

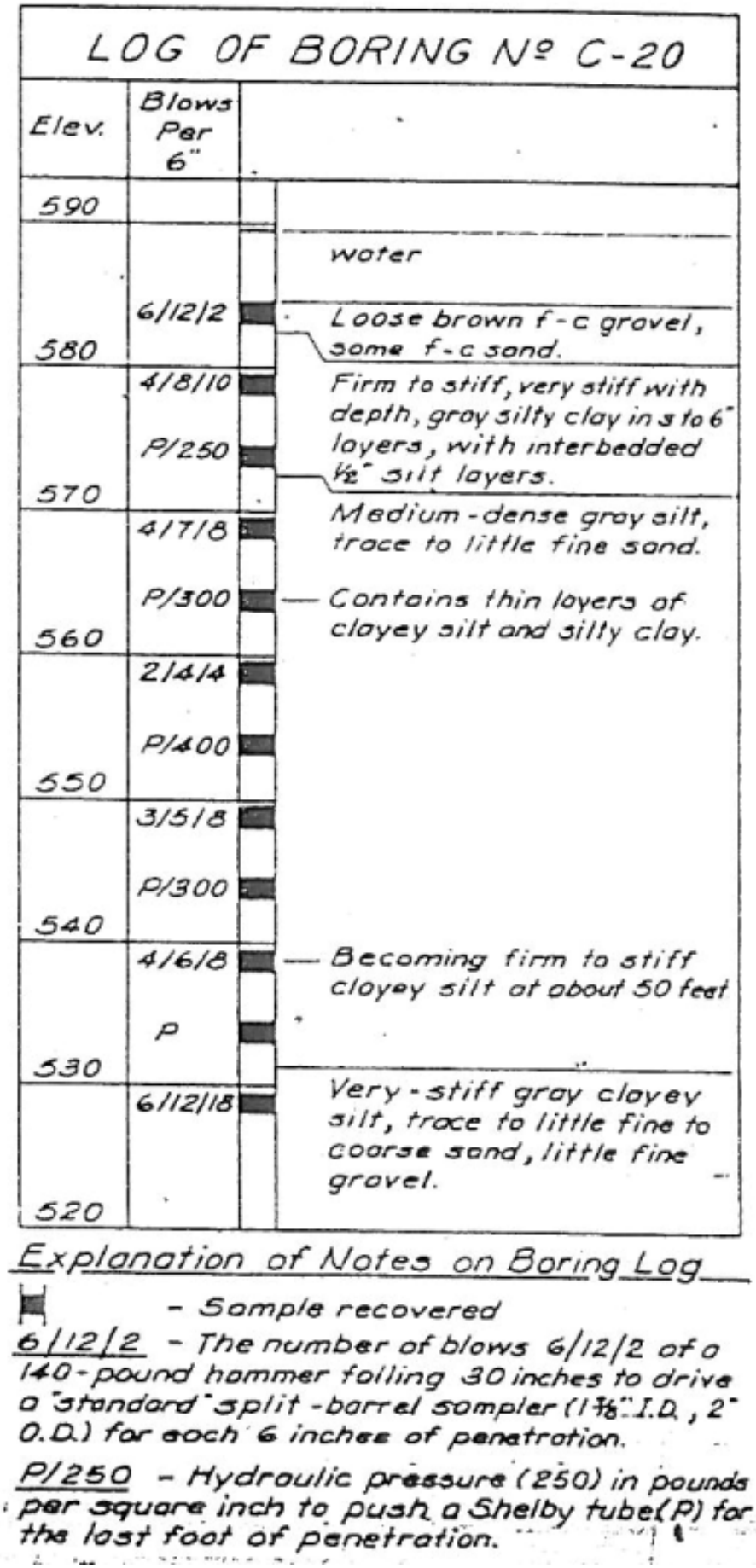
STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / FAY	DRILL RIG: B-57 TRUCK	STATION / OFFSET: 24+12, 8' LT.	EXPLORATION ID B-005-0-19
TYPE: ROADWAY	SAMPLING FIRM / LOGGER: OTB / FAY	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE	
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 603.5 (MSL) EOB: 8.0 ft.	PAGE 1 OF 1
START: 5/15/19 END: 5/15/19	SAMPLING METHOD: SPT	ENERGY RATIO (%): 90*	LAT / LONG: 41.394670, -81.628430	

MATERIAL DESCRIPTION AND NOTES	ELEV. 603.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
ASPHALT (15")	602.3																	
VERY DENSE, GRAY, **STONE FRAGMENTS WITH SAND**, TRACE SILT, TRACE ASPHALT GRINDINGS, (FILL), DRY	600.8					1A	-	-	-	-	-	-	-	-	-	3	A-1-b (V)	
				62	100 -	1B	-	21	15	33	21	10	-	-	-	11	A-2-4 (V)	
VERY DENSE, BROWN WITH BLACK, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CINDERS, (FILL), DRY	599.5	1	23 23 18	9	89	SS-2	2.50	0	0	28	51	21	27	19	8	16	A-4b (7)	
STIFF TO VERY STIFF, BROWN, **SILT**, LITTLE TO SOME CLAY, MOIST		2 3 4 5 6	8 3 3 2 2 2	6	83	SS-3	1.00	0	0	30	52	18	25	18	7	24	A-4b (7)	
	595.5	7	1 1 2	5	100	SS-4	1.00	-	-	-	-	-	-	-	-	32	A-4b (V)	
		EOB 8																

NOTES: NONE

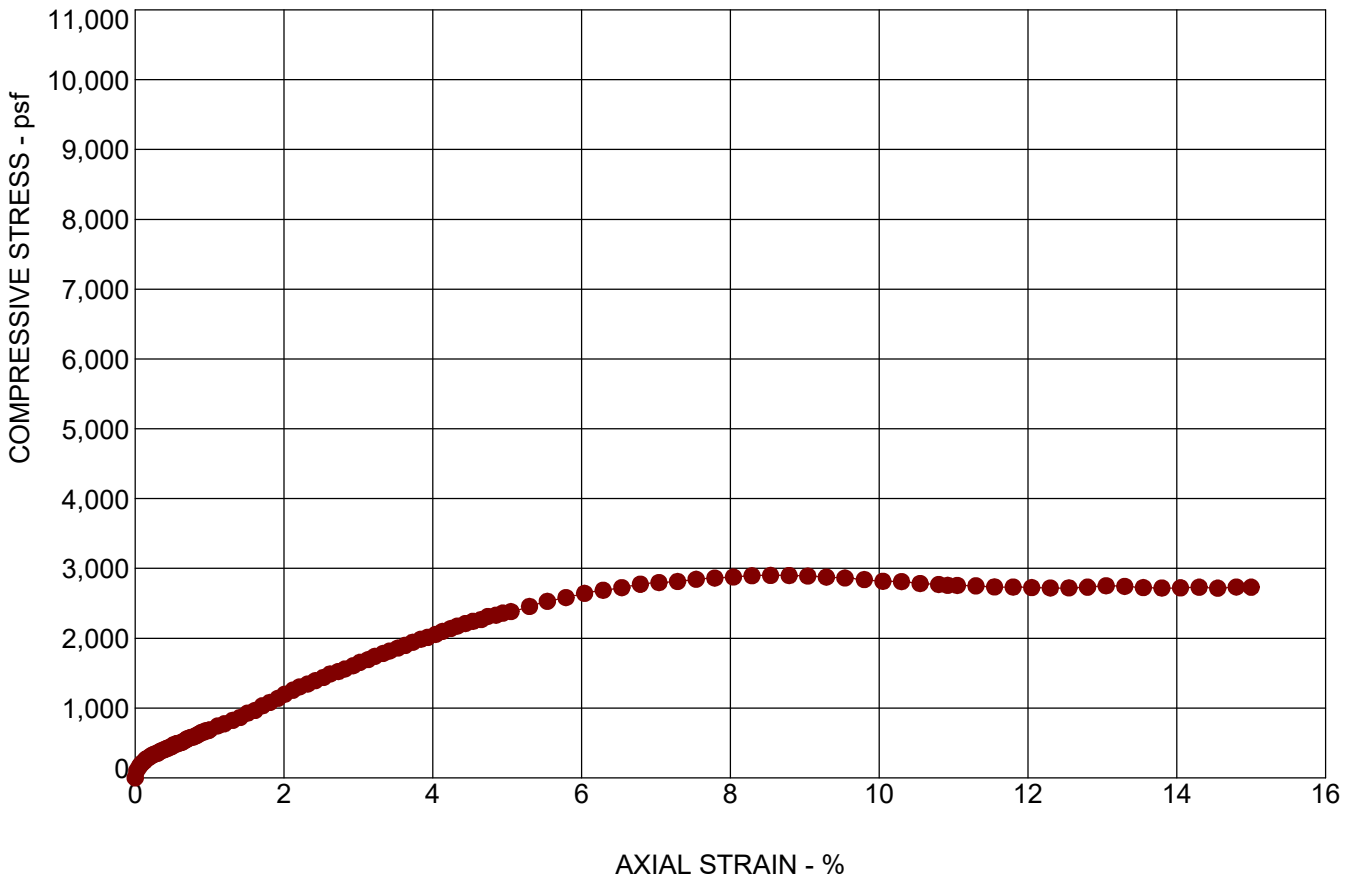
ABANDONMENT METHODS, MATERIALS, QUANTITIES: AUGER CUTTIINGS WITH ASPHALT PATCH

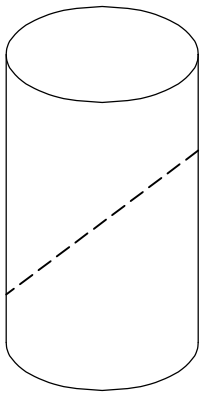


Note: Historic Boring Log C-20 from Archive Drawing Rockside Road Bridge over Cuyahoga River Sheet No. B-90 (drawing undated)

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Shear (dashed)	Moisture Content:	%	26.6
	Dry Density:	pcf	104.4
	Diameter:	in.	2.81
	Height:	in.	5.67
	Height / Diameter Ratio:		2.01
	Calculated Saturation:	%	116.76
	Calculated Void Ratio:		0.61
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	8.54
	Compressive Strength	(tsf)	1.45
	Undrained Shear Strength:	(tsf)	0.72
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	12.1
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

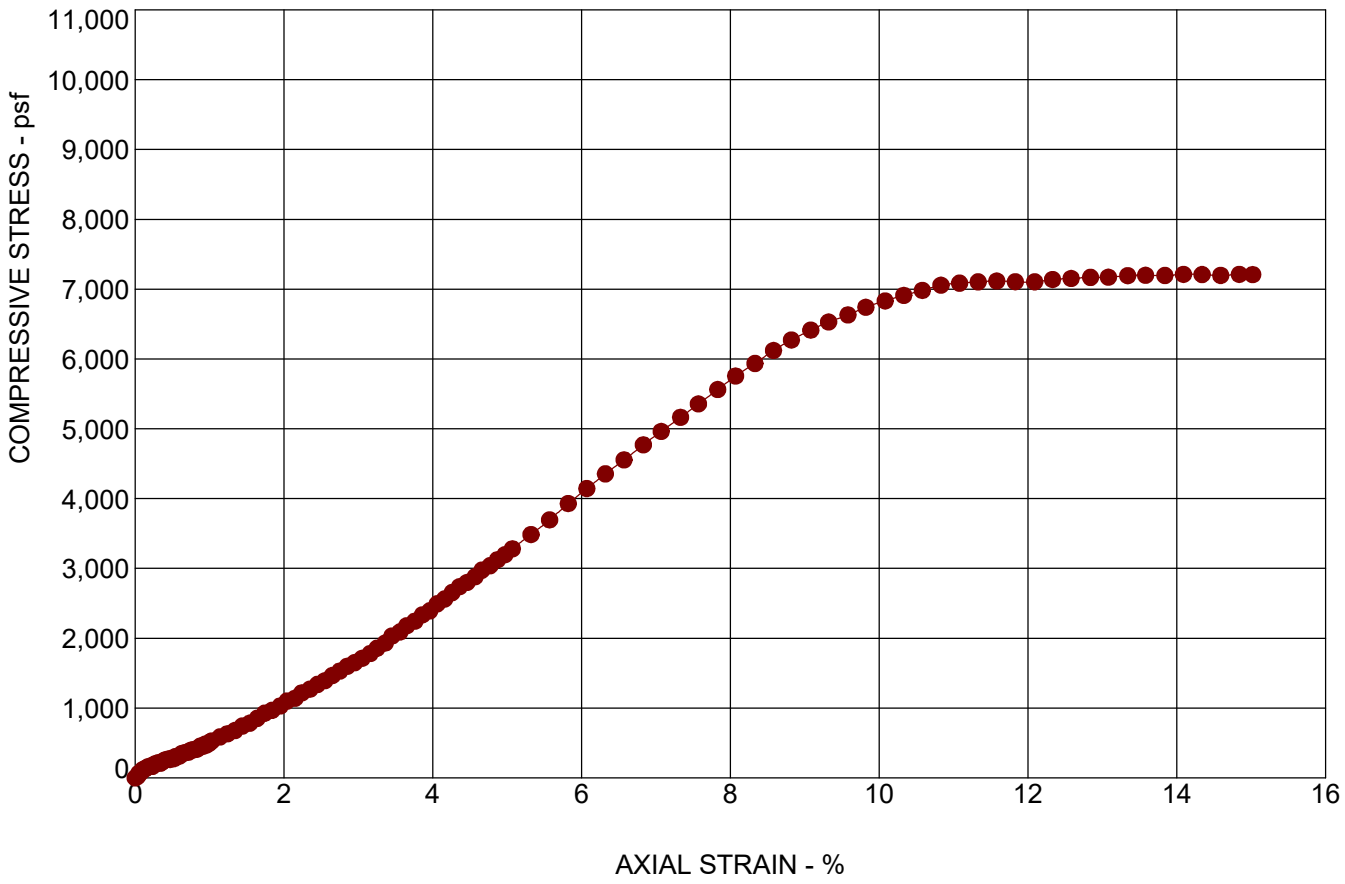
SAMPLE TYPE: Shelby Tube	SAMPLE LOCATION: B-002-0-19 @ 31 - 33 feet			
SAMPLE DESCRIPTION: GRAY SANDY SILT - A-4a (8)	LL	PL	PI	Percent < #200 Sieve
	27	21	6	99

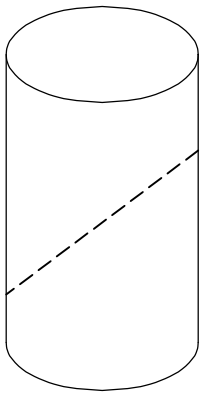
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-1

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Shear (dashed)	Moisture Content:	%	21.8
	Dry Density:	pcf	112.8
	Diameter:	in.	2.76
	Height:	in.	5.54
	Height / Diameter Ratio:		2.01
	Calculated Saturation:	%	118.80
	Calculated Void Ratio:		0.49
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	14.09
	Compressive Strength	(tsf)	3.61
	Undrained Shear Strength:	(tsf)	1.80
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	18.1
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

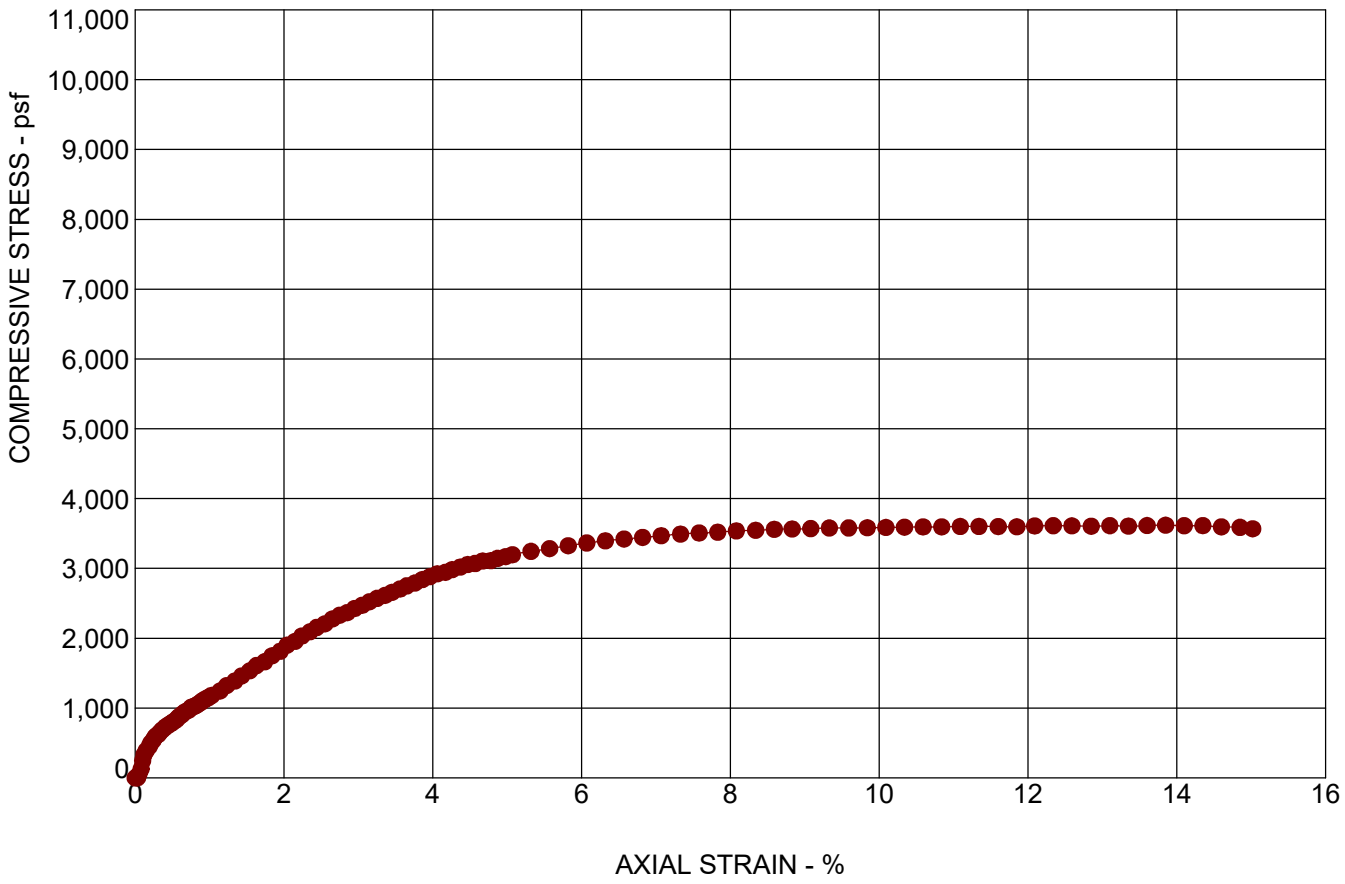
SAMPLE TYPE: Shelby Tube	SAMPLE LOCATION: B-003-0-19 @ 31 - 33 feet			
SAMPLE DESCRIPTION: GRAY SILT A-4b (8)	LL	PL	PI	Percent < #200 Sieve
	24	20	4	100

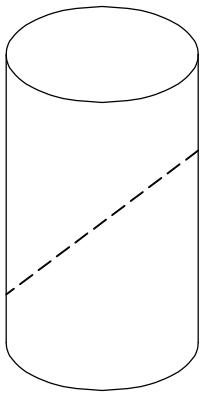
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Shear (dashed)	Moisture Content:	%	24.0
	Dry Density:	pcf	106.3
	Diameter:	in.	2.82
	Height:	in.	5.69
	Height / Diameter Ratio:		2.01
	Calculated Saturation:	%	110.36
	Calculated Void Ratio:		0.59
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	13.85
	Compressive Strength	(tsf)	1.81
	Undrained Shear Strength:	(tsf)	0.90
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	31.2
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

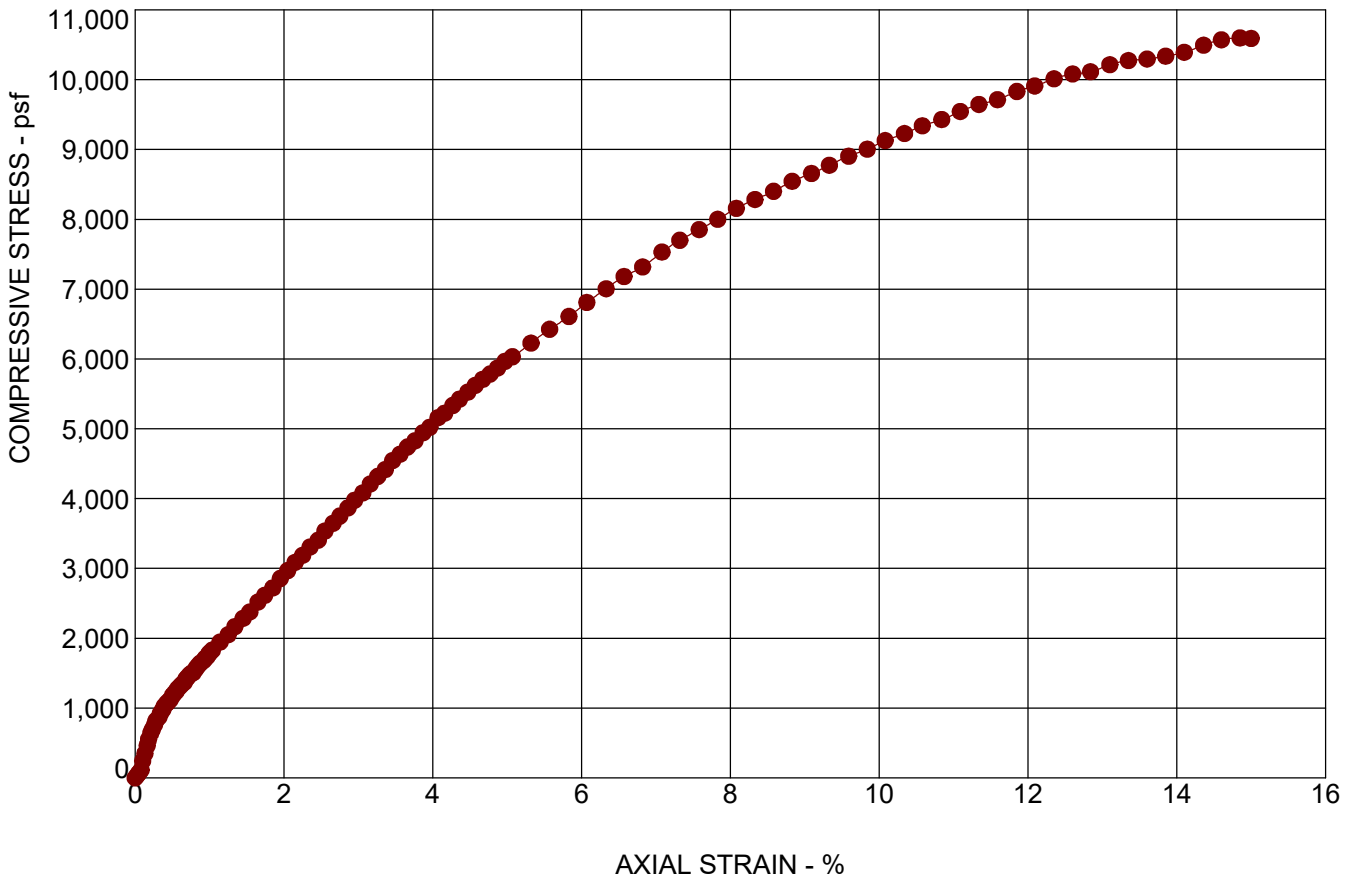
SAMPLE TYPE:	SAMPLE LOCATION: B-003-0-16 @ 58.5 feet			
SAMPLE DESCRIPTION: GRAY SILT AND CLAY A-6a (8)	LL	PL	PI	Percent < #200 Sieve
	30	19	11	94

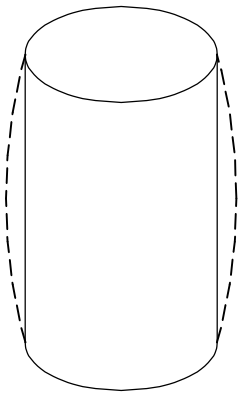
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Bulge (dashed)	Moisture Content:	%	16.6
	Dry Density:	pcf	119.2
	Diameter:	in.	2.85
	Height:	in.	5.69
	Height / Diameter Ratio:		1.99
	Calculated Saturation:	%	108.40
	Calculated Void Ratio:		0.41
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	14.85
	Compressive Strength	(tsf)	5.30
	Undrained Shear Strength:	(tsf)	2.65
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	42.4
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

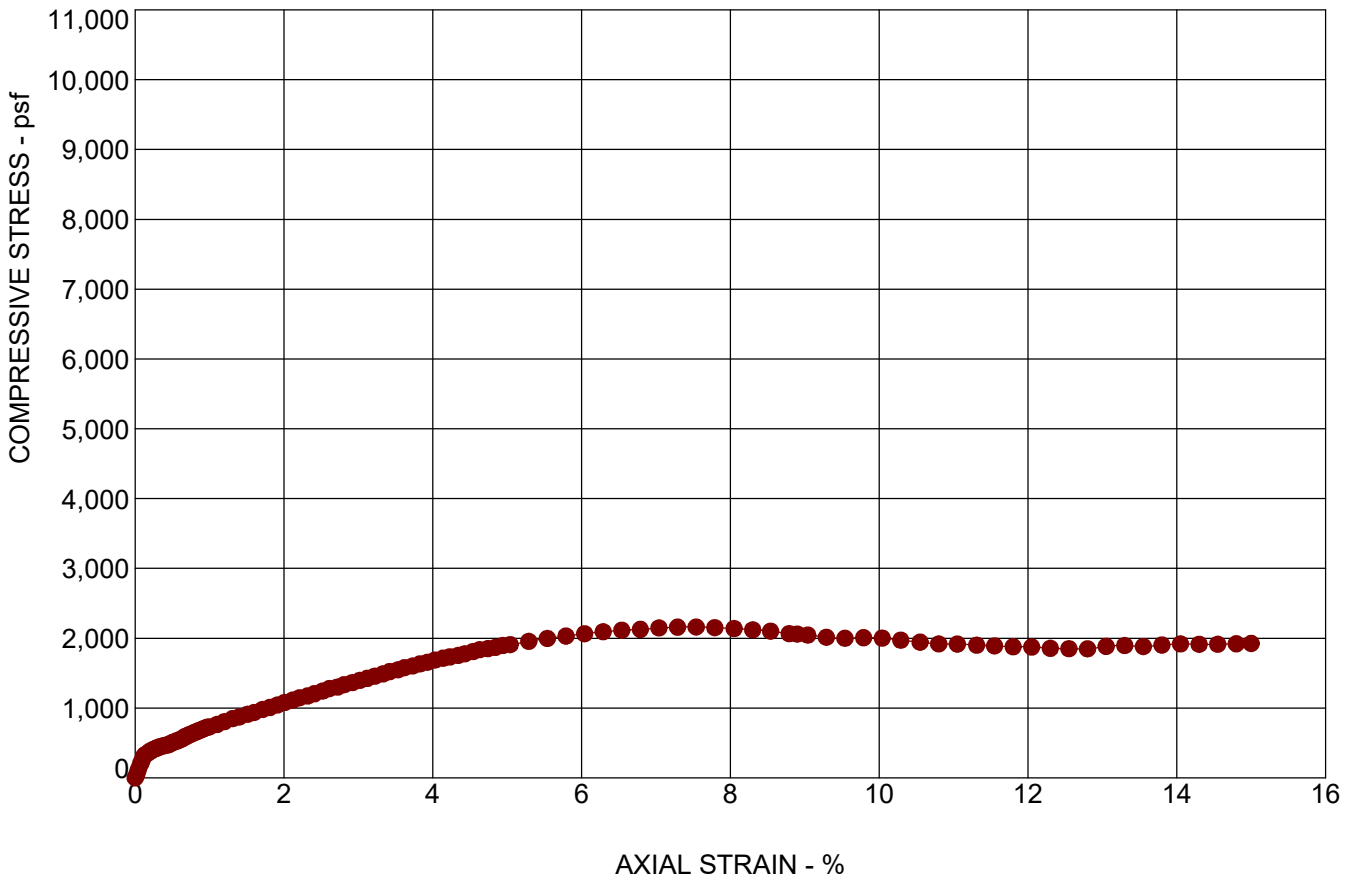
SAMPLE TYPE:	SAMPLE LOCATION: B-003-0-16 @ 83.5 feet			
SAMPLE DESCRIPTION: GRAY SANDY SILT A-4a (8)	LL	PL	PI	Percent < #200 Sieve
	25	18	7	87

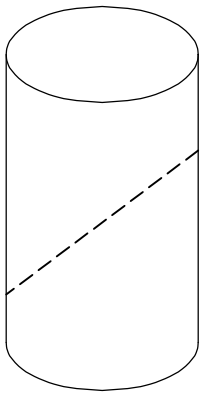
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Shear (dashed)	Moisture Content:	%	26.6
	Dry Density:	pcf	101.7
	Diameter:	in.	2.81
	Height:	in.	5.66
	Height / Diameter Ratio:		2.02
	Calculated Saturation:	%	109.40
	Calculated Void Ratio:		0.66
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	7.54
	Compressive Strength	(tsf)	1.08
	Undrained Shear Strength:	(tsf)	0.54
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	20.8
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

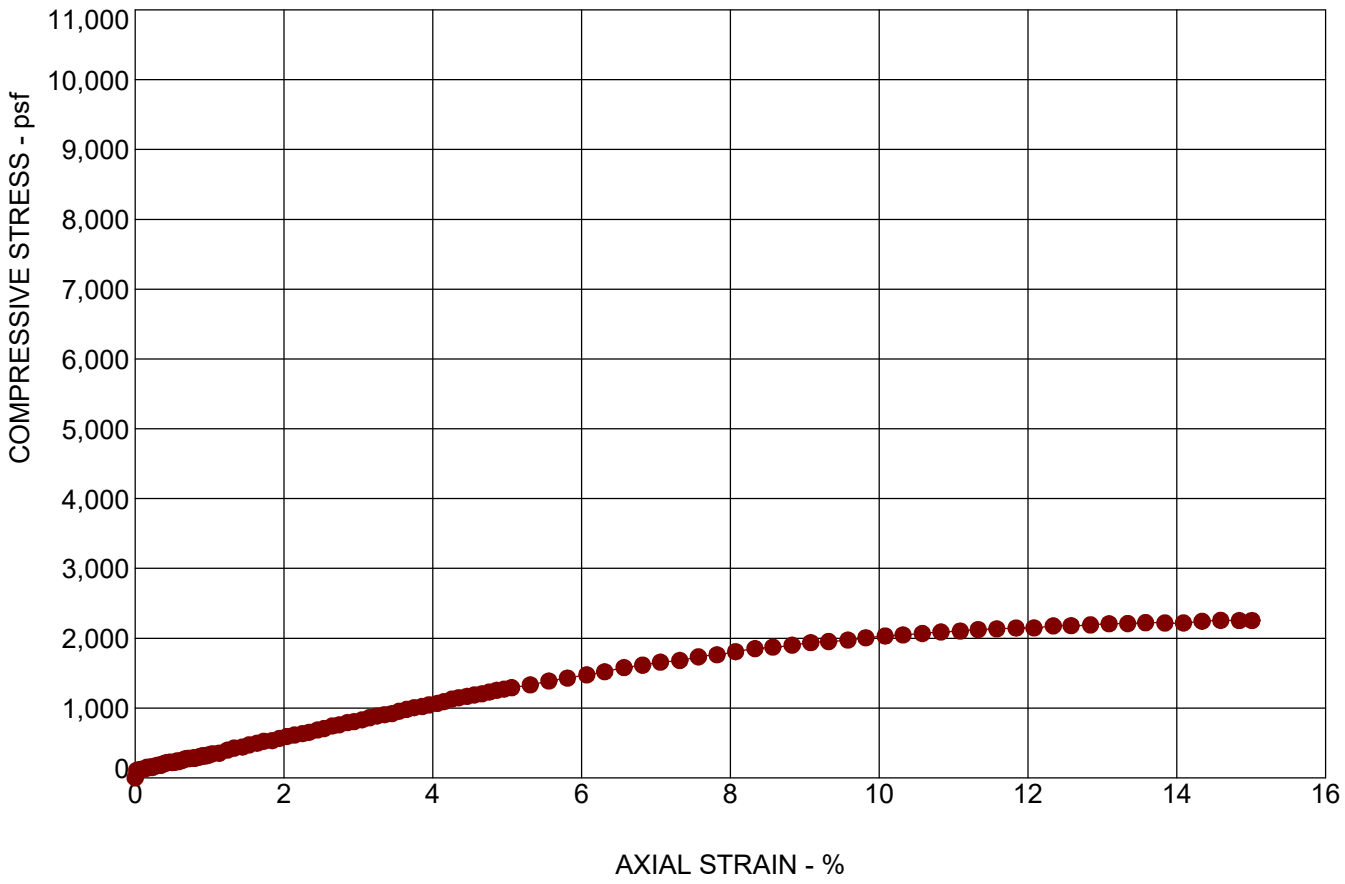
SAMPLE TYPE: Shelby Tube	SAMPLE LOCATION: B-004-0-19 @ 31 - 33 feet			
SAMPLE DESCRIPTION: GRAY SILT AND CLAY A-6a (8)	LL	PL	PI	Percent < #200 Sieve
	31	20	11	100

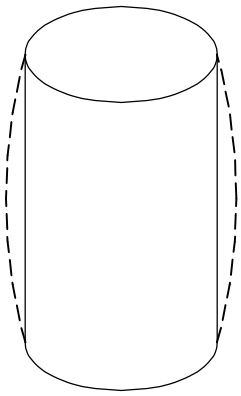
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
	Moisture Content:	%	24.2
	Dry Density:	pcf	106.7
	Diameter:	in.	2.80
	Height:	in.	5.55
	Height / Diameter Ratio:		1.98
	Calculated Saturation:	%	112.93
	Calculated Void Ratio:		0.58
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	14.59
	Compressive Strength	(tsf)	1.13
	Undrained Shear Strength:	(tsf)	0.56
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	25.5
Failure Mode: Bulge (dashed)	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

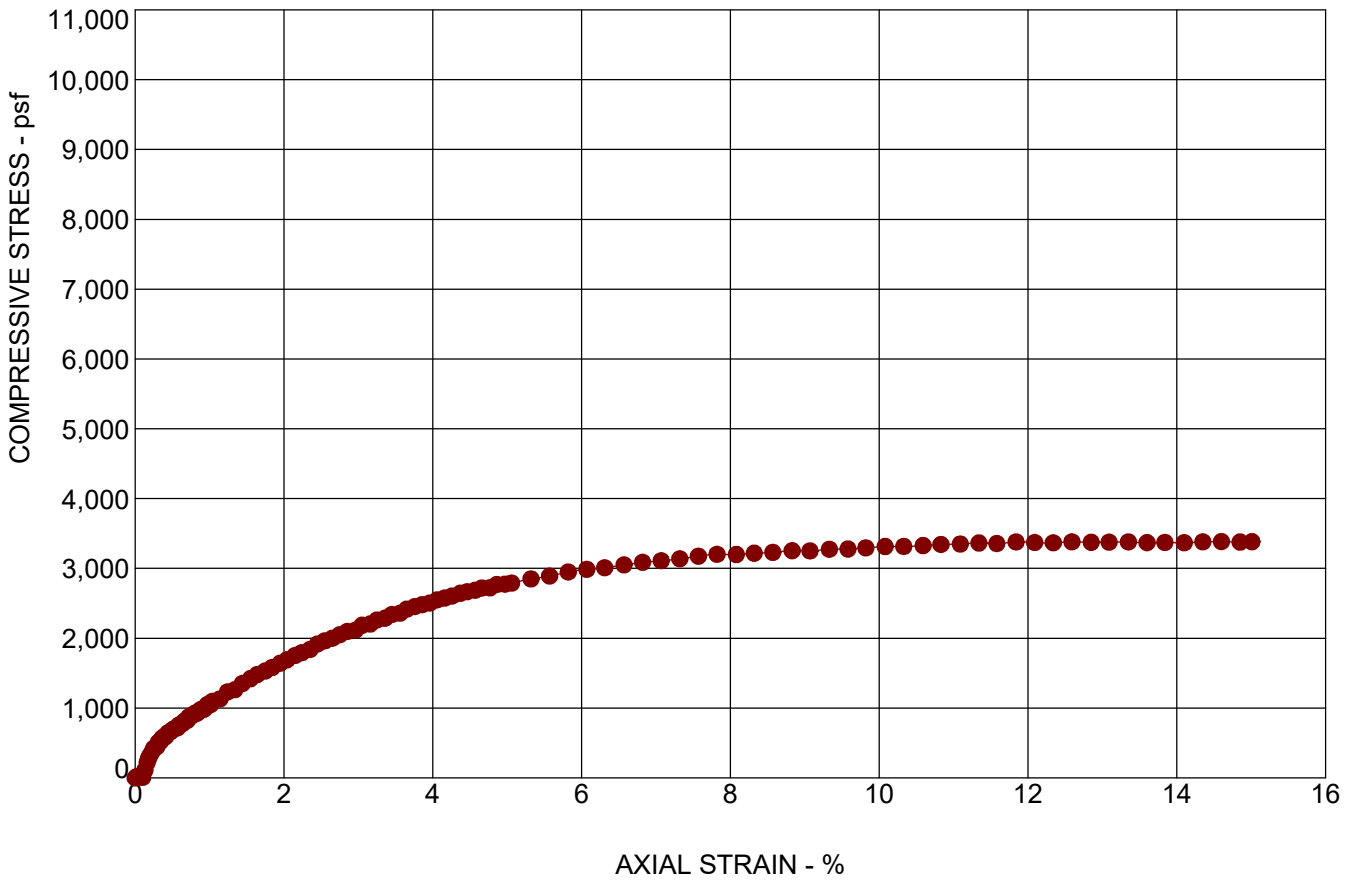
SAMPLE TYPE: Shelby Tube	SAMPLE LOCATION: B-004-0-19 @ 41 - 43 feet			
SAMPLE DESCRIPTION: GRAY SILT A-4b (8)	LL	PL	PI	Percent < #200 Sieve
	23	20	3	100

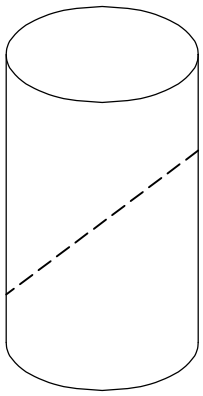
PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-6

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

UNCONSOLIDATED-UNDRAINED TEST

ASTM D2850



SPECIMEN FAILURE MODE	SPECIMEN TEST DATA		
 Failure Mode: Shear (dashed)	Moisture Content:	%	22.7
	Dry Density:	pcf	107.7
	Diameter:	in.	2.85
	Height:	in.	5.68
	Height / Diameter Ratio:		2.00
	Calculated Saturation:	%	108.53
	Calculated Void Ratio:		0.56
	Assumed Specific Gravity:		2.7
	Failure Strain:	%	14.60
	Compressive Strength	(tsf)	1.69
	Undrained Shear Strength:	(tsf)	0.85
	Strain Rate:	in/min	0.0560
	Cell Pressure:	psi	37.5
	Remarks: Calculated saturation of over 100% is likely the result of measurement limitations and use of an assumed specific gravity value.		

SAMPLE TYPE: Shelby Tube	SAMPLE LOCATION: B-004-0-19 @ 71 - 73 feet			
SAMPLE DESCRIPTION: GRAY SILT A-4b (8)	LL	PL	PI	Percent < #200 Sieve
	26	18	8	93

PROJECT: Old Rockside Road Bridge Replacement	Terracon 12460 Plaza Dr Parma, OH	PROJECT NUMBER: N6175053
SITE: Old Rockside Road Valley View, Ohio		CLIENT: Burgess & Niple, Inc. Painesville, Ohio
		EXHIBIT: B-7

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. UNDRAINED-UNCONSOL. N6175053(CHATTENOOGAFILE).GPJ TERRACON_DATATEMPLATE.GDT 8/9/19

SUPPORTING INFORMATION

Contents:

ODOT Quick Reference for Visual Description of Soils
ODOT Classification of Soils

Note: All attachments are one page unless noted above.

ODOT Quick Reference for Visual Description of Soils

1) STRENGTH OF SOIL:

Non-Cohesive (granular) Soils - Compactness	
Description	**Blows Per Ft.**
Very Loose	≤ 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 – 50
Very Dense	> 50

2) COLOR :

If a color is a uniform color throughout, the term is single, modified by an adjective such as light or dark. If the predominate color is shaded by a secondary color, the secondary color procedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term "mottled"

3) PRIMARY COMPONENT

Use **DESCRIPTION** from ODOT Soil Classification Chart on Back

Cohesive (fine grained) Soils - Consistency

Description	Qu (TSF)	Blows Per Ft.	Hand Manipulation
Very Soft	<0.25	<2	Easily penetrates 2" by fist
Soft	0.25-0.5	2 - 4	Easily penetrates 2" by thumb
Medium Stiff	0.5-1.0	5 - 8	Penetrates by thumb with moderate effort
Stiff	1.0-2.0	9 - 15	Readily indents by thumb, but not penetrate
Very Stiff	2.0-4.0	16 - 30	Readily indents by thumbnail
Hard	>4.0	>30	Indent with difficulty by thumbnail

4) COMPONENT MODIFIERS:

Description	Percentage By Weight
Trace	0% - 10%
Little	10% - 20%
Some	20% - 35%
"And"	35% -50%

5) Soil Organic Content

Description	% by Weight
Slightly Organic	2% - 4%
Moderately Organic	4% - 10%
Highly Organic	> 10%

6) Relative Visual Moisture

Description	Criteria	
	Cohesive Soil	**Non-cohesive Soils**
Dry	Powdery; Cannot be rolled; Water content well below the plastic limit	No moisture present
Damp	Leaves very little moisture when pressed between fingers; Crumbles at or before rolled to $^1/_8$"; Water content below plastic limit	Internal moisture, but no to little surface moisture
Moist	Leaves small amounts of moisture when pressed between fingers; Rolled to $^1/_8$" or smaller before crumbling; Water content above plastic limit to -3% of the liquid limit	Free water on surface, moist (shiny) appearance
Wet	Very mushy; Rolled multiple times to $^1/_8$" or smaller before crumbles; Near or above the liquid limit	Voids filled with free water, can be poured from split spoon.

CLASSIFICATION OF SOILS

Ohio Department of Transportation

(The classification of a soil is found by proceeding from top to bottom of the chart.
The first classification that the test data fits is the correct classification.)

SYMBOL	DESCRIPTION	Classifcation AASHTO	Classifcation OHIO	$LL_0/LL \times 100$*	% Pass #40	% Pass #200	Liquid Limit (LL)	Plastic Index (PI)	Group Index Max.	REMARKS
	Gravel and/or Stone Fragments	A-1-a			30 Max.	15 Max.		6 Max.	0	Min. of 50% combined gravel, cobble and boulder sizes
	Gravel and/or Stone Fragments with Sand	A-1-b			50 Max.	25 Max.		6 Max.	0	
	Fine Sand	A-3			51 Min.	10 Max.	NON-PLASTIC		0	
	Coarse and Fine Sand	--	A-3a			35 Max.		6 Max.	0	Min. of 50% combined coarse and fine sand sizes
	Gravel and/or Stone Fragments with Sand and Silt	A-2-4 A-2-5				35 Max.	40 Max. 41 Min.	10 Max.	0	
	Gravel and/or Stone Fragments with Sand, Silt and Clay	A-2-6 A-2-7				35 Max.	40 Max. 41 Min.	11 Min.	4	
	Sandy Silt	A-4	A-4a	76 Min.		36 Min.	40 Max.	10 Max.	8	Less than 50% silt sizes
	Silt	A-4	A-4b	76 Min.		50 Min.	40 Max.	10 Max.	8	50% or more silt sizes
	Elastic Silt and Clay	A-5		76 Min.		36 Min.	41 Min.	10 Max.	12	
	Silt and Clay	A-6	A-6a	76 Min.		36 Min.	40 Max.	11 - 15	10	
	Silty Clay	A-6	A-6b	76 Min.		36 Min.	40 Max.	16 Min.	16	
	Elastic Clay	A-7-5		76 Min.		36 Min.	41 Min.	$\leq$LL-30	20	
	Clay	A-7-6		76 Min.		36 Min.	41 Min.	>LL-30	20	
	Organic Silt	A-8	A-8a	75 Max.		36 Min.				W/o organics would classify as A-4a or A-4b
	Organic Clay	A-8	A-8b	75 Max.		36 Min.				W/o organics would classify as A-5, A-6a, A-6b, A-7-5 or A-7-6

MATERIAL CLASSIFIED BY VISUAL INSPECTION

 Sod and Topsoil

 Pavement or Base

 Uncontrolled Fill (Describe)

 Bouldery Zone



Peat

* Only perform the oven-dried liquid limit test and this calculation if organic material is present in the sample.

CALCULATIONS

Contents:

Driven Pile Capacity (12 analyses, 48 total pages)
Downdrag Calculations (4 pages)
Wave Equation Analysis of Pile Driving (WEAP) Inputs and Results (313 pages)
Shallow Foundation Bearing Resistance (4 pages)
Shallow Foundation Settlement (8 pages)
Embankment Settlement Calculations (13 pages)
Geotechnical Bulletin GB-1 (5 pages)

Note: All attachments are one page unless noted above.

DRIVEN PILE CAPACITY

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Driving
Date:	2/23/2021

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	12
Pile Type:	Pipe Pile
Pipe Diameter (in)	12
End Type:	Closed End ▼
End Area (in^2):	113.1
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	37.7

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Driving
Date:	2/23/2021

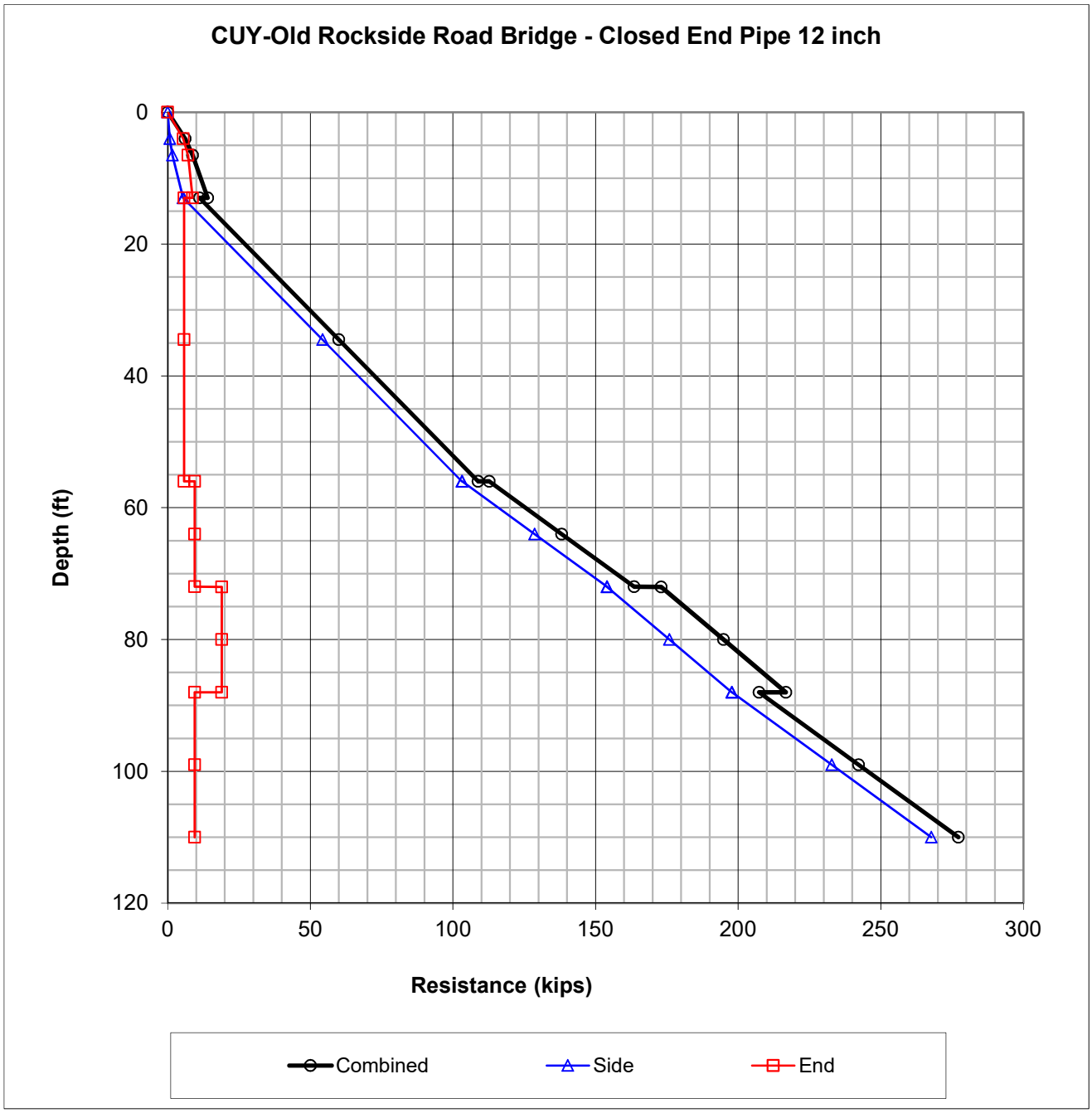
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	597
Depth of Pile (ft)	0.0
Depth to Water (ft)	4.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	13	30	30		120	0.83
13	56	0	0	1200	130	0.67
56	72	0	0	2000	130	0.67
72	88	0	0	4000	135	0.67
88	110	0	0	2000	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Driving
Date:	2/23/2021



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Driving
Date:	2/23/2021

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 12 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 113.1, Perimeter = 37.7
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 597 feet, Water = 4 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
4.00	240	480	1.12	0.80	17.7	0.58	30	480	7	10	13.0	0	1	5	6
6.50	552	624	1.12	0.80	17.7	0.58	30	624	9	10	13.0	0	2	7	9
12.99	811	998	1.12	0.80	17.7	0.58	30	998	14	10	13.0	0	5	9	14
13.01	998	999	0.00	0.00	0.0	0.00	0	999	0	0	56.0	1080	5	6	11
34.50	1725	2452	0.00	0.00	0.0	0.00	0	2452	0	0	56.0	1080	54	6	60
55.99	3178	3904	0.00	0.00	0.0	0.00	0	3000	0	0	56.0	1080	103	6	109
56.01	3905	3906	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	103	9	113
64.00	4176	4446	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	129	9	138
71.99	4716	4986	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	154	9	163
72.01	4987	4987	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	154	19	173
80.00	5277	5567	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	176	19	195
87.99	5857	6148	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	198	19	217
88.01	6148	6149	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	198	9	207
99.00	6520	6892	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	233	9	242
110.00	7264	7636	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	268	9	277

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	12
Pile Type:	Pipe Pile
Pipe Diameter (in)	12
End Type:	Closed End ▼
End Area (in^2):	113.1
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	37.7

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

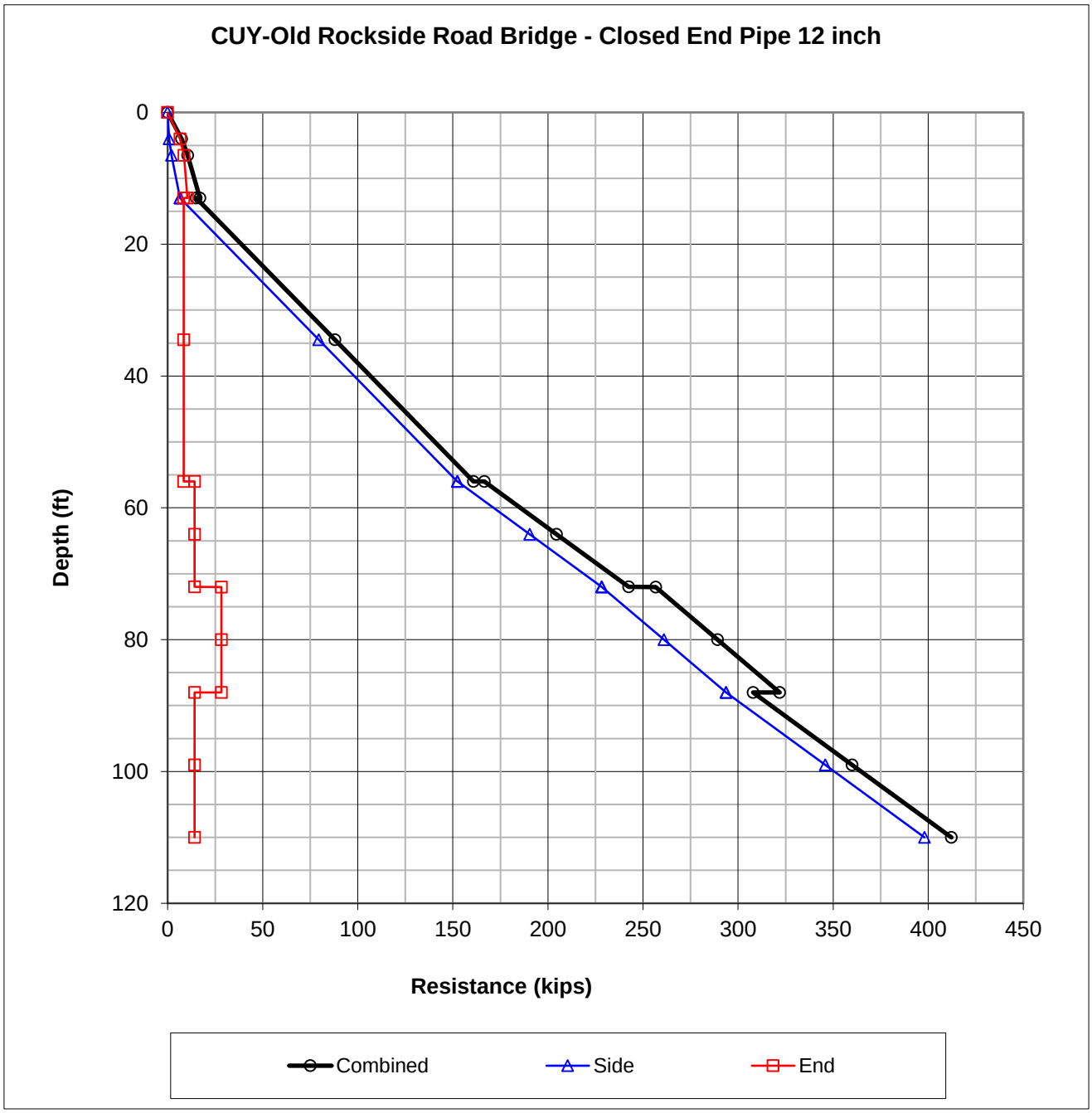
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	597
Depth of Pile (ft)	0.0
Depth to Water (ft)	4.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	13	30	30		120	1
13	56	0	0	1200	130	1
56	72	0	0	2000	130	1
72	88	0	0	4000	135	1
88	110	0	0	2000	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Ultimate
Date:	8/24/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 12 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 113.1, Perimeter = 37.7
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 597 feet, Water = 4 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
4.00	240	480	1.12	0.80	17.7	0.58	30	480	7	10	13.0	0	1	7	7
6.50	552	624	1.12	0.80	17.7	0.58	30	624	9	10	13.0	0	2	9	11
12.99	811	998	1.12	0.80	17.7	0.58	30	998	14	10	13.0	0	6	10	17
13.01	998	999	0.00	0.00	0.0	0.00	0	999	0	0	56.0	1080	7	8	15
34.50	1725	2452	0.00	0.00	0.0	0.00	0	2452	0	0	56.0	1080	79	8	88
55.99	3178	3904	0.00	0.00	0.0	0.00	0	3000	0	0	56.0	1080	152	8	161
56.01	3905	3906	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	152	14	167
64.00	4176	4446	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	190	14	205
71.99	4716	4986	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1510	228	14	242
72.01	4987	4987	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	228	28	257
80.00	5277	5567	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	261	28	289
87.99	5857	6148	0.00	0.00	0.0	0.00	0	3000	0	0	88.0	1300	294	28	322
88.01	6148	6149	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	294	14	308
99.00	6520	6892	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	346	14	360
110.00	7264	7636	0.00	0.00	0.0	0.00	0	3000	0	0	110.0	1510	398	14	412

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Driving
Date:	2/23/2021

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Driving
Date:	2/23/2021

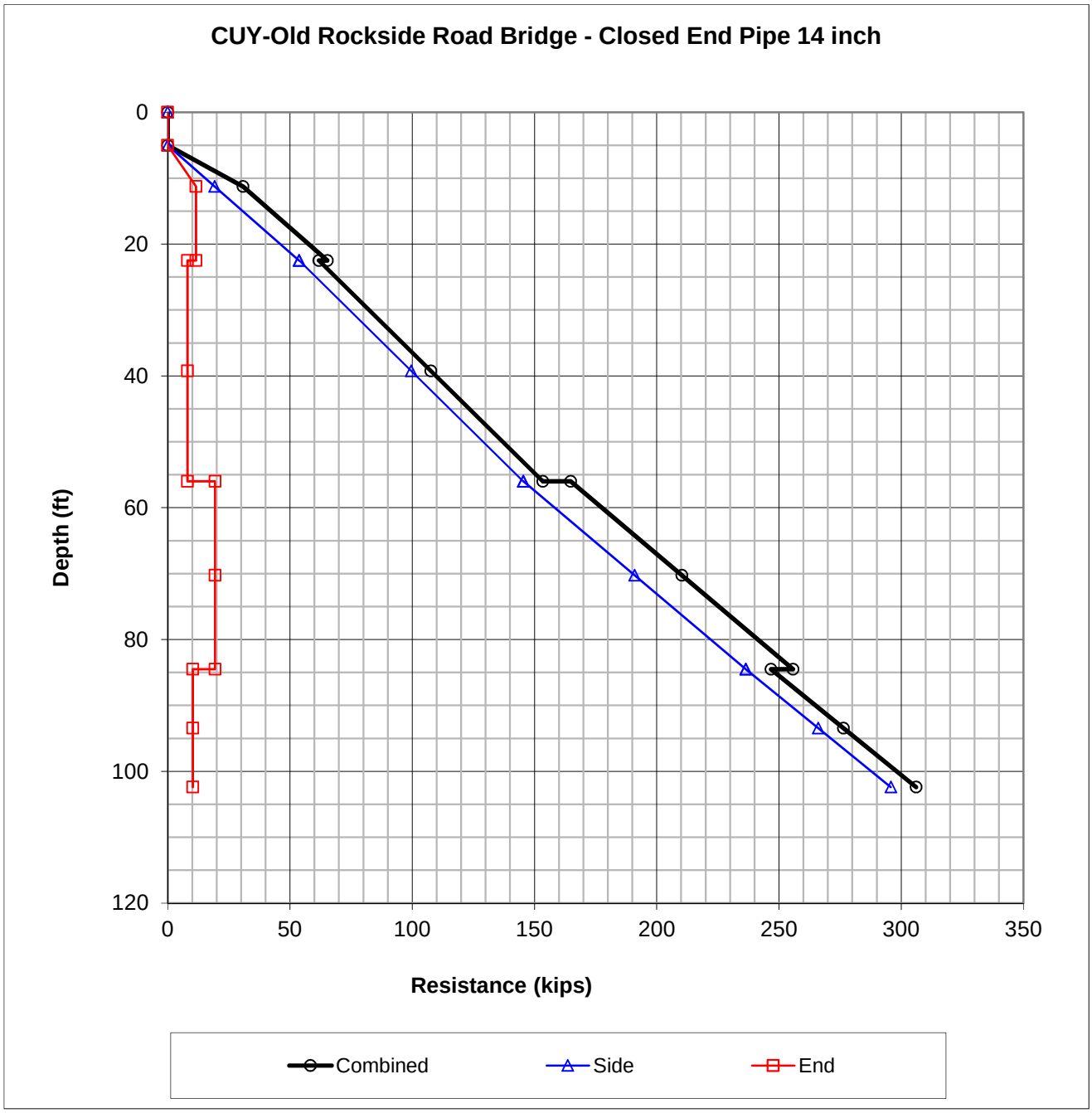
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	582
Depth of Pile (ft)	5.0
Depth to Water (ft)	0.0

Top (ft)	Bottom (ft)	f - side	f - end	s_u (psf)	g (pcf)	Resistance Factor
0	22.5			1800	130	0.67
22.5	56			1250	130	0.67
56	84.5			3000	135	0.67
84.5	102.4			1600	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Driving
Date:	2/23/2021



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Driving
Date:	2/23/2021

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 582 feet, Water = 0 feet, Pile = 5 feet

Depth (ft)	s' at Midpoint (psf)	s' at Tip (psf)	Coefficient of Lateral Stress (K_d)	Correction Factor (C_f)	Pile-Soil Friction Angle (d)	a	N'_q	Limiting s' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
5.00	169	338	0.00	0.00	0.0	0.00	0	338	0	0	19.3	1250	0	0	0
11.25	549	761	0.00	0.00	0.0	0.00	0	761	0	0	19.3	1250	19	12	31
22.49	1140	1520	0.00	0.00	0.0	0.00	0	1520	0	0	19.3	1250	54	12	65
22.51	1521	1522	0.00	0.00	0.0	0.00	0	1522	0	0	48.0	1115	54	8	62
39.25	2087	2653	0.00	0.00	0.0	0.00	0	2653	0	0	48.0	1115	100	8	108
55.99	3219	3785	0.00	0.00	0.0	0.00	0	3000	0	0	48.0	1115	145	8	153
56.01	3786	3786	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	145	19	165
70.25	4303	4820	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	191	19	210
84.49	5337	5854	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	236	19	256
84.51	5855	5855	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	236	10	247
93.45	6158	6460	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	266	10	276
102.40	6762	7065	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	296	10	306

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Ultimate
Date:	2/23/2021

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Ultimate
Date:	2/23/2021

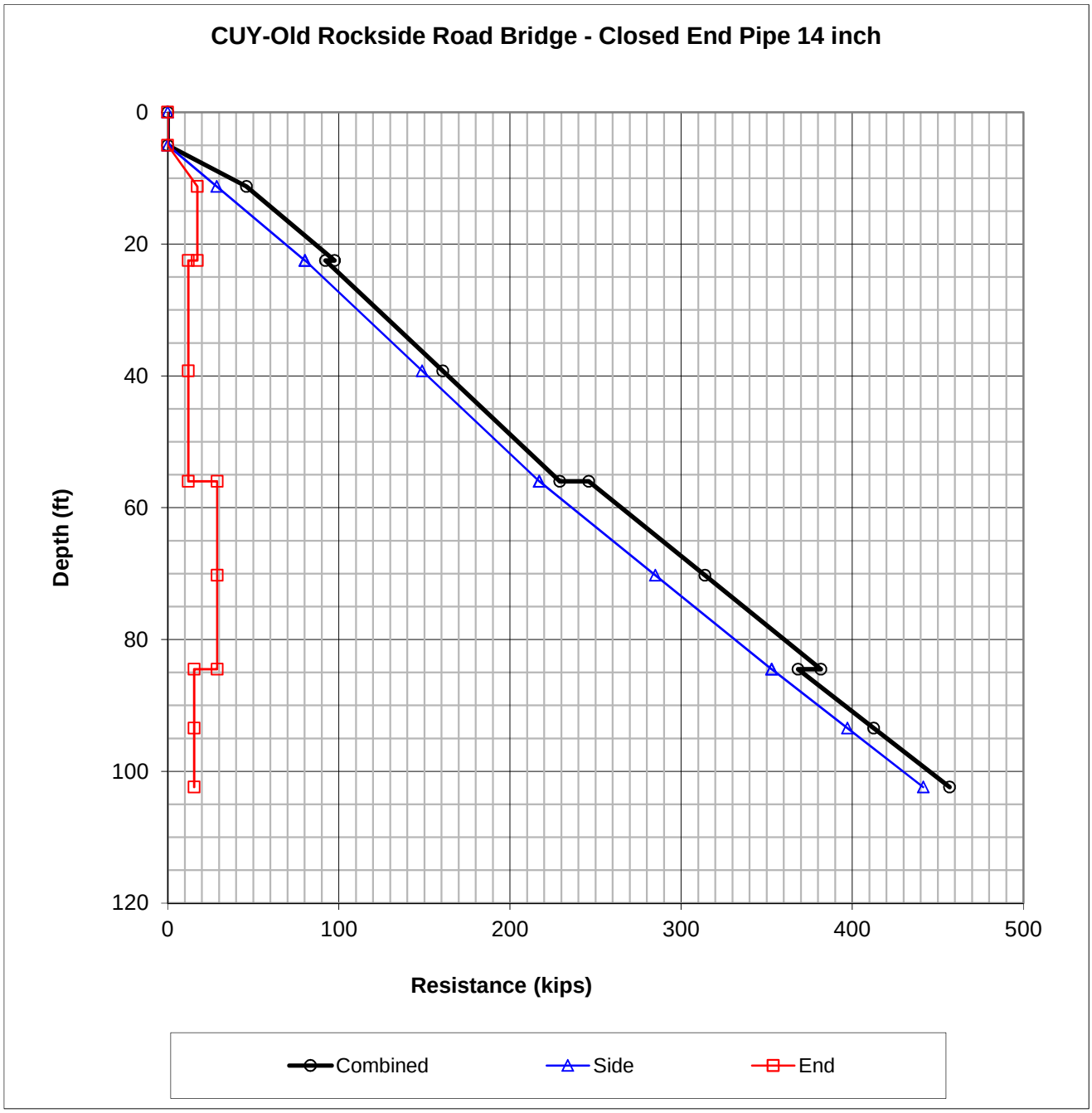
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	582
Depth of Pile (ft)	5.0
Depth to Water (ft)	0.0

Top (ft)	Bottom (ft)	f - side	f - end	s_u (psf)	g (pcf)	Resistance Factor
0	22.5			1800	130	1
22.5	56			1250	130	1
56	84.5			3000	135	1
84.5	102.4			1600	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Ultimate
Date:	2/23/2021



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 1, B-003 - Ultimate
Date:	2/23/2021

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 582 feet, Water = 0 feet, Pile = 5 feet

Depth (ft)	s' at Midpoint (psf)	s' at Tip (psf)	Coefficient of Lateral Stress (K_d)	Correction Factor (C_f)	Pile-Soil Friction Angle (d)	a	N'_q	Limiting s' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
5.00	169	338	0.00	0.00	0.0	0.00	0	338	0	0	19.3	1250	0	0	0
11.25	549	761	0.00	0.00	0.0	0.00	0	761	0	0	19.3	1250	29	17	46
22.49	1140	1520	0.00	0.00	0.0	0.00	0	1520	0	0	19.3	1250	80	17	97
22.51	1521	1522	0.00	0.00	0.0	0.00	0	1522	0	0	48.0	1115	80	12	92
39.25	2087	2653	0.00	0.00	0.0	0.00	0	2653	0	0	48.0	1115	149	12	161
55.99	3219	3785	0.00	0.00	0.0	0.00	0	3000	0	0	48.0	1115	217	12	229
56.01	3786	3786	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	217	29	246
70.25	4303	4820	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	285	29	314
84.49	5337	5854	0.00	0.00	0.0	0.00	0	3000	0	0	72.4	1300	353	29	382
84.51	5855	5855	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	353	15	368
93.45	6158	6460	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	397	15	413
102.40	6762	7065	0.00	0.00	0.0	0.00	0	3000	0	0	87.8	1350	441	15	457

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Driving
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Driving
Date:	8/25/2020

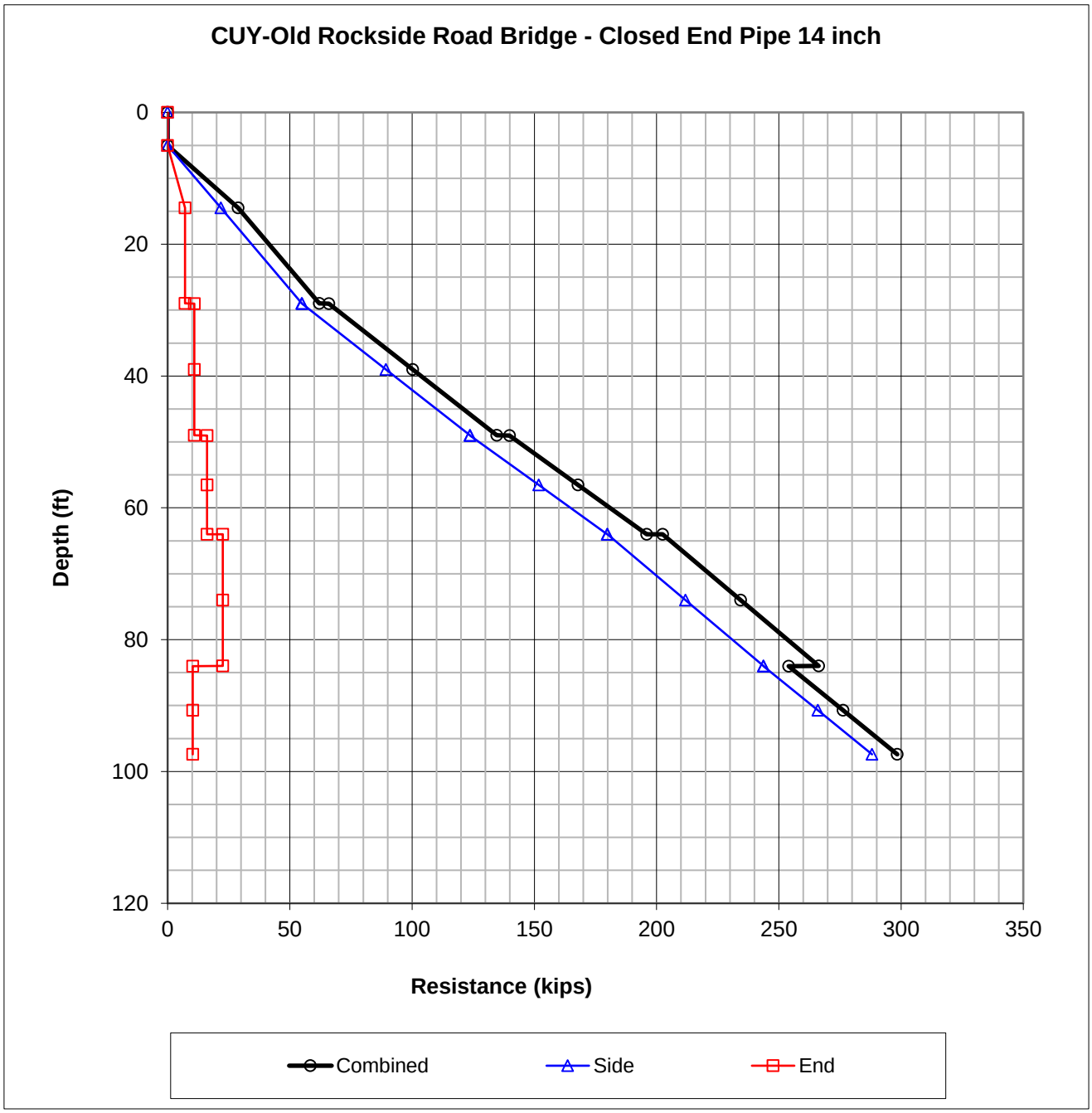
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	582
Depth of Pile (ft)	5.0
Depth to Water (ft)	0.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	29			1100	130	0.67
29	49			1700	130	0.67
49	64			2500	130	0.67
64	84			3500	135	0.67
84	97.4			1600	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Driving
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Driving
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 582 feet, Water = 0 feet, Pile = 5 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
5.00	169	338	0.00	0.00	0.0	0.00	0	338	0	0	24.9	932	0	0	0
14.50	659	980	0.00	0.00	0.0	0.00	0	980	0	0	24.9	932	22	7	29
28.99	1470	1960	0.00	0.00	0.0	0.00	0	1960	0	0	24.9	932	55	7	62
29.01	1960	1961	0.00	0.00	0.0	0.00	0	1961	0	0	42.0	1400	55	11	66
39.00	2299	2636	0.00	0.00	0.0	0.00	0	2636	0	0	42.0	1400	89	11	100
48.99	2974	3312	0.00	0.00	0.0	0.00	0	3000	0	0	42.0	1400	124	11	135
49.01	3312	3313	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	124	16	140
56.50	3566	3819	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	152	16	168
63.99	4073	4326	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	180	16	196
64.01	4326	4327	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	180	23	202
74.00	4690	5052	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	212	23	234
83.99	5415	5778	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	244	23	266
84.01	5778	5779	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	244	10	254
90.70	6005	6231	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	266	10	276
97.40	6458	6684	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	288	10	298

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Ultimate
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	Zero (scour or downdrag) ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Ultimate
Date:	8/25/2020

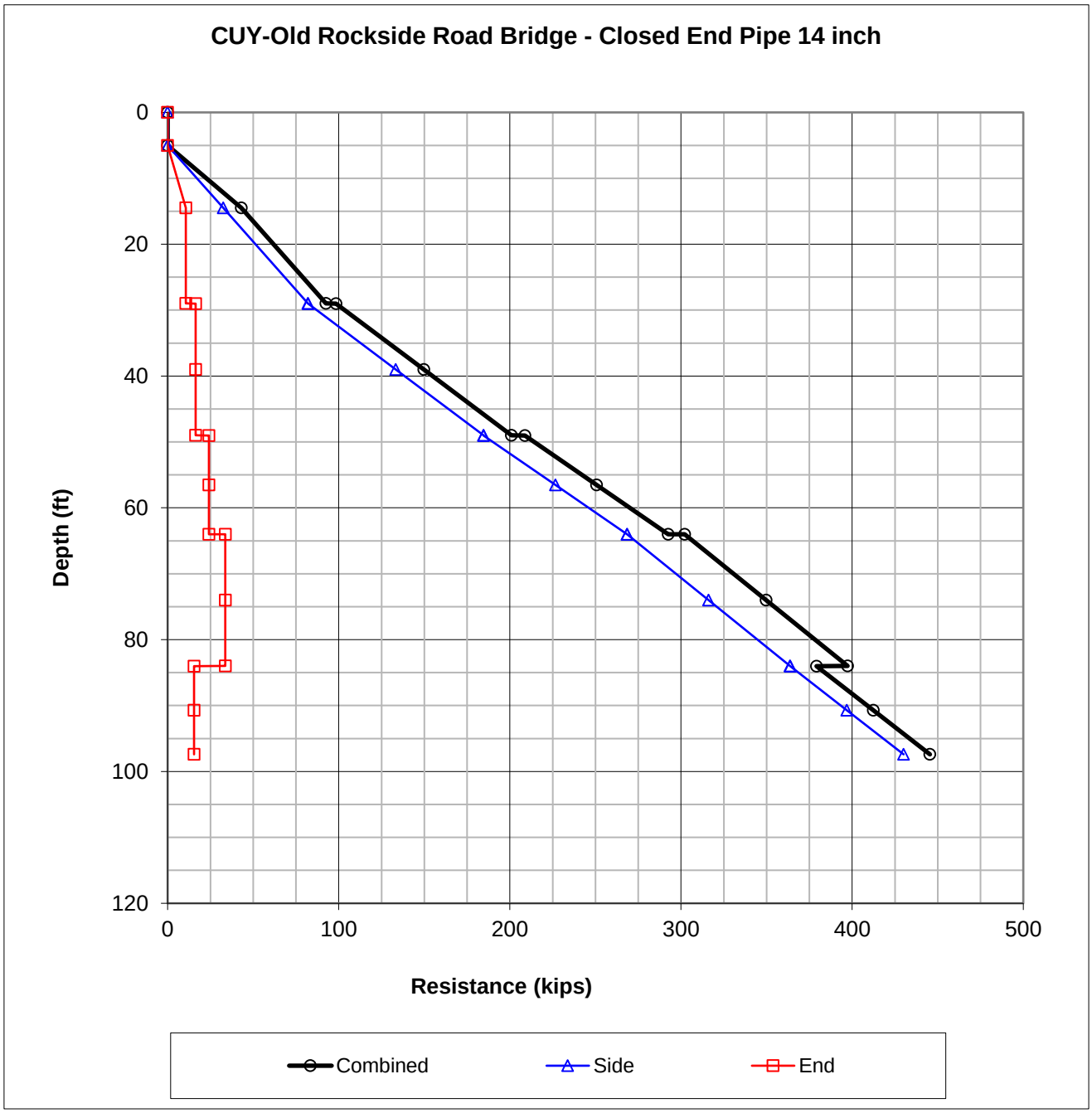
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	582
Depth of Pile (ft)	5.0
Depth to Water (ft)	0.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	29			1100	130	1
29	49			1700	130	1
49	64			2500	130	1
64	84			3500	135	1
84	97.4			1600	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Ultimate
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Pier 2, B-004 - Ultimate
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	Zero capacity assumed to a depth of 0 feet
Depths & Elevations	Ground elev = 582 feet, Water = 0 feet, Pile = 5 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
5.00	169	338	0.00	0.00	0.0	0.00	0	338	0	0	24.9	932	0	0	0
14.50	659	980	0.00	0.00	0.0	0.00	0	980	0	0	24.9	932	32	11	43
28.99	1470	1960	0.00	0.00	0.0	0.00	0	1960	0	0	24.9	932	82	11	93
29.01	1960	1961	0.00	0.00	0.0	0.00	0	1961	0	0	42.0	1400	82	16	98
39.00	2299	2636	0.00	0.00	0.0	0.00	0	2636	0	0	42.0	1400	133	16	150
48.99	2974	3312	0.00	0.00	0.0	0.00	0	3000	0	0	42.0	1400	185	16	201
49.01	3312	3313	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	185	24	209
56.50	3566	3819	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	227	24	251
63.99	4073	4326	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1525	268	24	292
64.01	4326	4327	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	268	34	302
74.00	4690	5052	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	316	34	350
83.99	5415	5778	0.00	0.00	0.0	0.00	0	3000	0	0	72.0	1300	364	34	397
84.01	5778	5779	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	364	15	379
90.70	6005	6231	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	397	15	412
97.40	6458	6684	0.00	0.00	0.0	0.00	0	3000	0	0	83.5	1350	430	15	445

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Driving
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	12
Pile Type:	Pipe Pile
Pipe Diameter (in)	12
End Type:	Closed End ▼
End Area (in^2):	113.1
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	37.7

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	Zero (scour or downdrag) ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Driving
Date:	8/25/2020

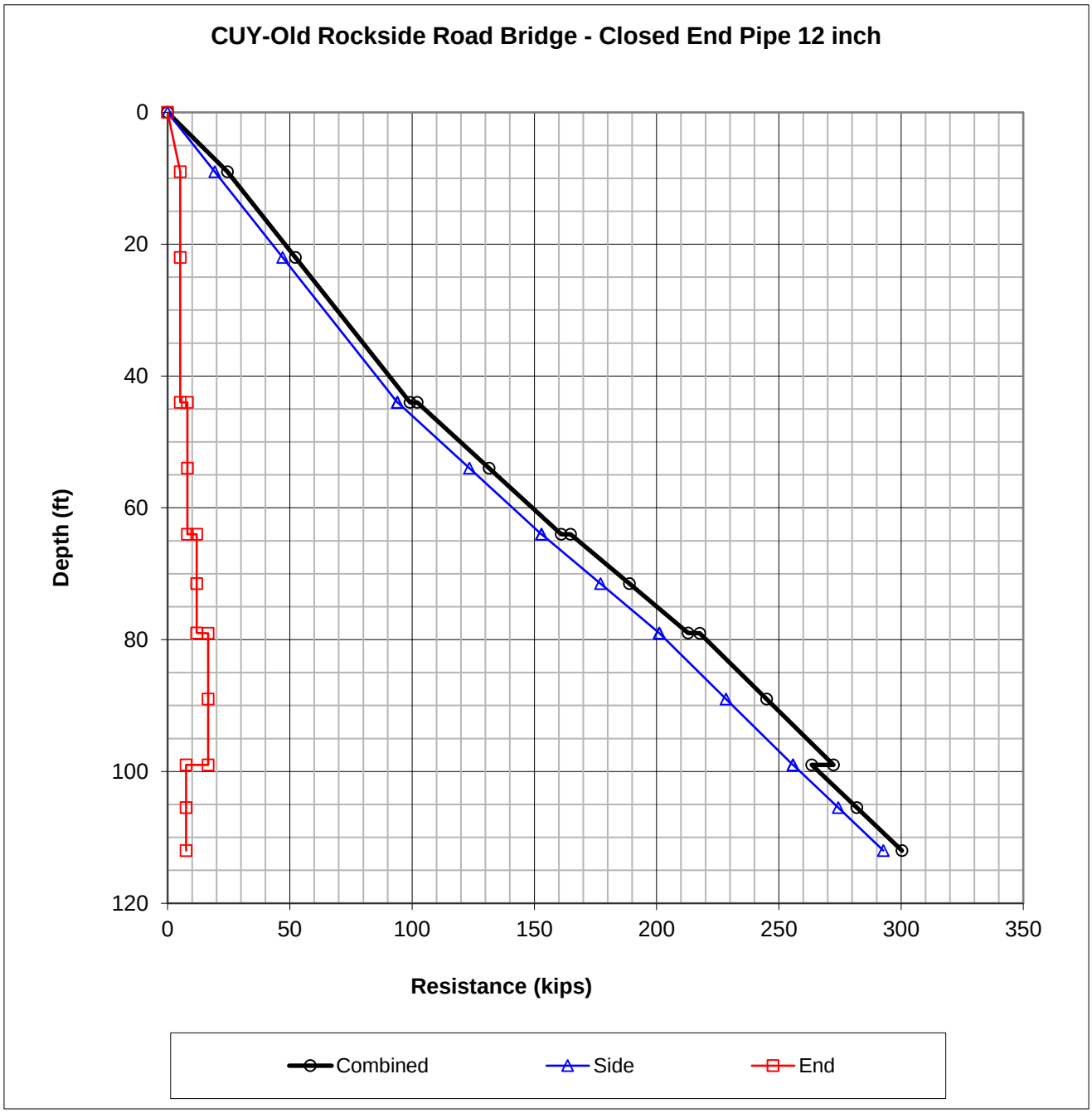
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	597
Depth of Pile (ft)	0.0
Depth to Water (ft)	9.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	44			1100	130	0.67
44	64			1700	130	0.67
64	79			2500	130	0.67
79	99			3500	135	0.67
99	112			1600	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Driving
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Driving
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 12 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 113.1, Perimeter = 37.7
Advanced Options	Zero capacity assumed to a depth of 0 feet
Depths & Elevations	Ground elev = 597 feet, Water = 9 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
9.00	585	1170	0.00	0.00	0.0	0.00	0	1170	0	0	44.0	1015	19	5	24
22.00	1609	2049	0.00	0.00	0.0	0.00	0	2049	0	0	44.0	1015	47	5	52
43.99	2792	3535	0.00	0.00	0.0	0.00	0	3000	0	0	44.0	1015	94	5	99
44.01	3536	3537	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	94	8	102
54.00	3874	4212	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	123	8	132
63.99	4550	4887	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	153	8	161
64.01	4888	4889	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	153	12	165
71.50	5142	5395	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	177	12	189
78.99	5648	5901	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	201	12	213
79.01	5902	5903	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	201	17	218
89.00	6265	6628	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	228	17	245
98.99	6991	7353	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	256	17	272
99.01	7354	7355	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	256	8	263
105.50	7574	7793	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	274	8	282
112.00	8013	8233	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	293	8	300

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	12
Pile Type:	Pipe Pile
Pipe Diameter (in)	12
End Type:	Closed End ▼
End Area (in^2):	113.1
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	37.7

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	Zero (scour or downdrag) ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

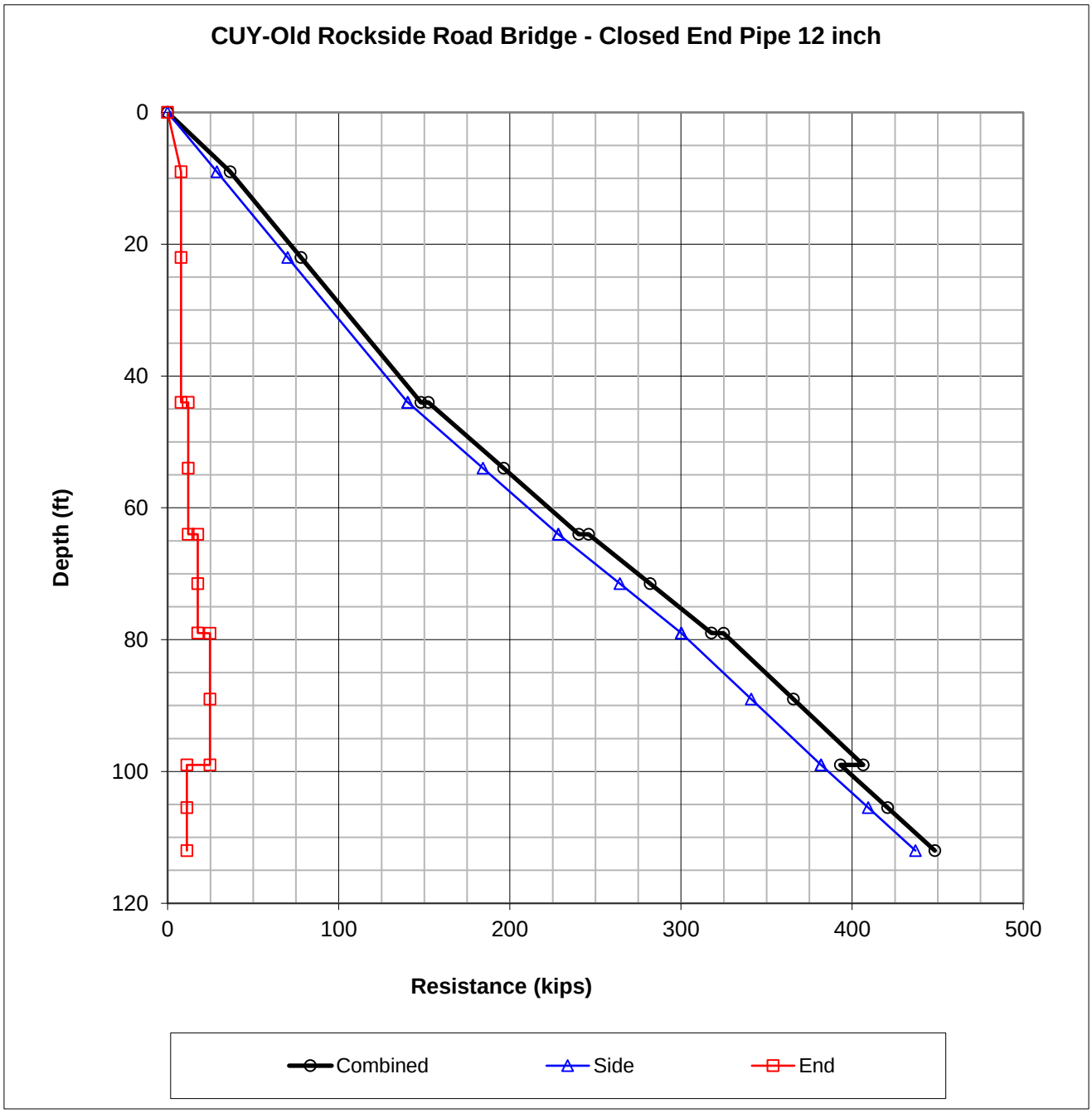
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	597
Depth of Pile (ft)	0.0
Depth to Water (ft)	9.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	44			1100	130	1
44	64			1700	130	1
64	79			2500	130	1
79	99			3500	135	1
99	112			1600	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Ultimate
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 12 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 113.1, Perimeter = 37.7
Advanced Options	Zero capacity assumed to a depth of 0 feet
Depths & Elevations	Ground elev = 597 feet, Water = 9 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
9.00	585	1170	0.00	0.00	0.0	0.00	0	1170	0	0	44.0	1015	29	8	36
22.00	1609	2049	0.00	0.00	0.0	0.00	0	2049	0	0	44.0	1015	70	8	78
43.99	2792	3535	0.00	0.00	0.0	0.00	0	3000	0	0	44.0	1015	140	8	148
44.01	3536	3537	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	140	12	152
54.00	3874	4212	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	184	12	196
63.99	4550	4887	0.00	0.00	0.0	0.00	0	3000	0	0	64.0	1400	228	12	240
64.01	4888	4889	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	228	18	246
71.50	5142	5395	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	264	18	282
78.99	5648	5901	0.00	0.00	0.0	0.00	0	3000	0	0	79.0	1525	300	18	318
79.01	5902	5903	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	300	25	325
89.00	6265	6628	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	341	25	366
98.99	6991	7353	0.00	0.00	0.0	0.00	0	3000	0	0	99.0	1300	382	25	407
99.01	7354	7355	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	382	11	393
105.50	7574	7793	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	409	11	421
112.00	8013	8233	0.00	0.00	0.0	0.00	0	3000	0	0	112.0	1350	437	11	448

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Driving
Date:	2/23/2021

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Driving
Date:	2/23/2021

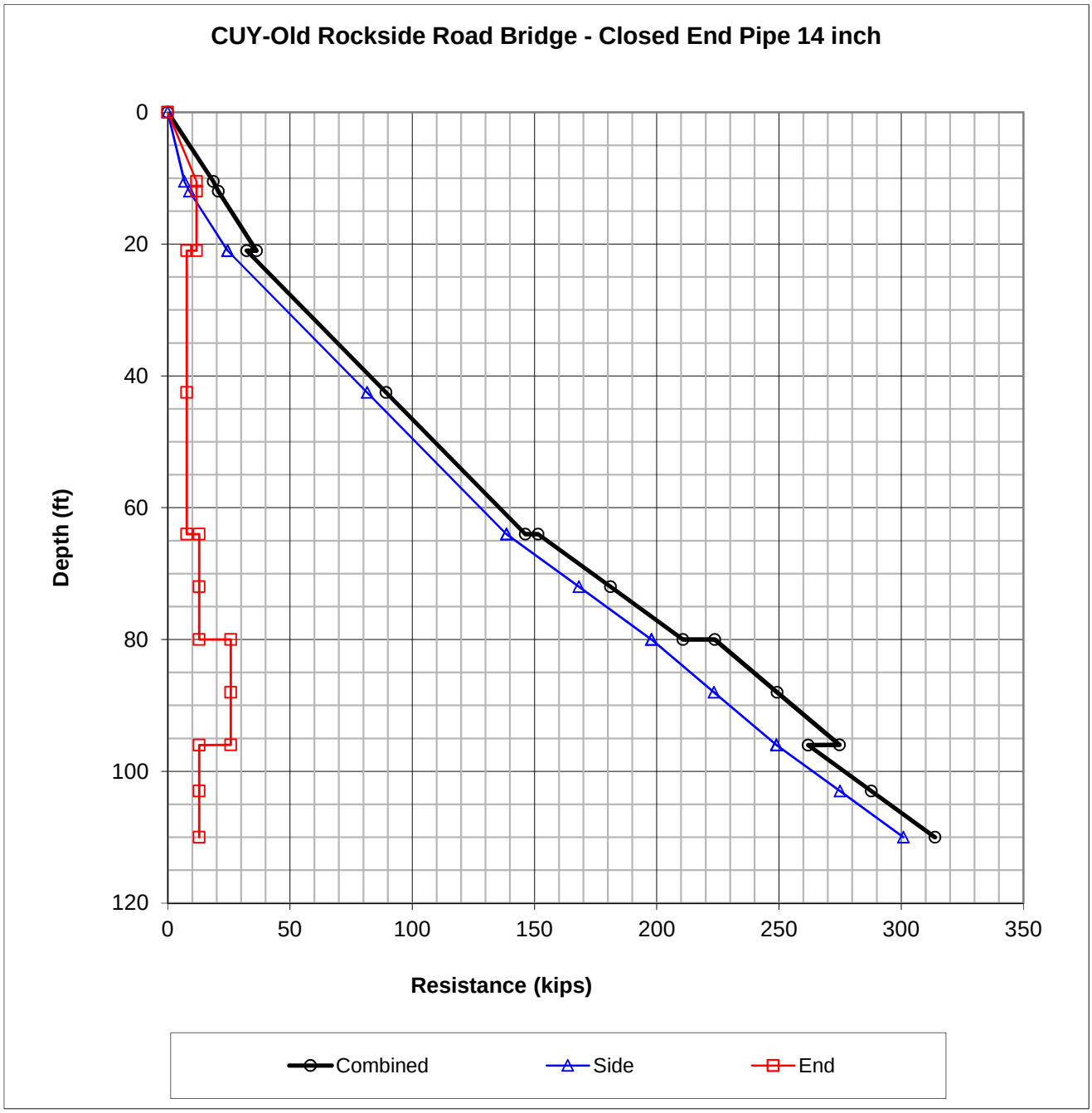
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	605
Depth of Pile (ft)	0.0
Depth to Water (ft)	12.0

Top (ft)	Bottom (ft)	f - side	f - end	s_u (psf)	g (pcf)	Resistance Factor
0	21	30	30	0	120	0.83
21	64	0	0	1200	130	0.67
64	80	0	0	2000	130	0.67
80	96	0	0	4000	135	0.67
96	110	0	0	2000	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Driving
Date:	2/23/2021



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Driving
Date:	2/23/2021

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 605 feet, Water = 12 feet, Pile = 0 feet

Depth (ft)	s' at Midpoint (psf)	s' at Tip (psf)	Coefficient of Lateral Stress (K_d)	Correction Factor (C_f)	Pile-Soil Friction Angle (d)	a	N'_q	Limiting s' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
10.50	630	1260	1.16	0.85	20.1	0.58	30	1260	23	14	18.0	0	7	12	19
12.00	1350	1440	1.16	0.85	20.1	0.58	30	1440	27	14	18.0	0	9	12	21
20.99	1699	1958	1.16	0.85	20.1	0.58	30	1958	36	14	18.0	0	24	12	36
21.01	1958	1959	0.00	0.00	0.0	0.00	0	1959	0	0	54.9	1080	25	8	32
42.50	2685	3412	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1080	82	8	89
63.99	4138	4864	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1080	139	8	146
64.01	4865	4866	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	139	13	151
72.00	5136	5406	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	168	13	181
79.99	5676	5946	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	198	13	211
80.01	5947	5947	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	198	26	224
88.00	6237	6527	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	223	26	249
95.99	6817	7108	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	249	26	275
96.01	7108	7109	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	249	13	262
103.00	7345	7582	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	275	13	288
110.00	7818	8055	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	301	13	314

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	None ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

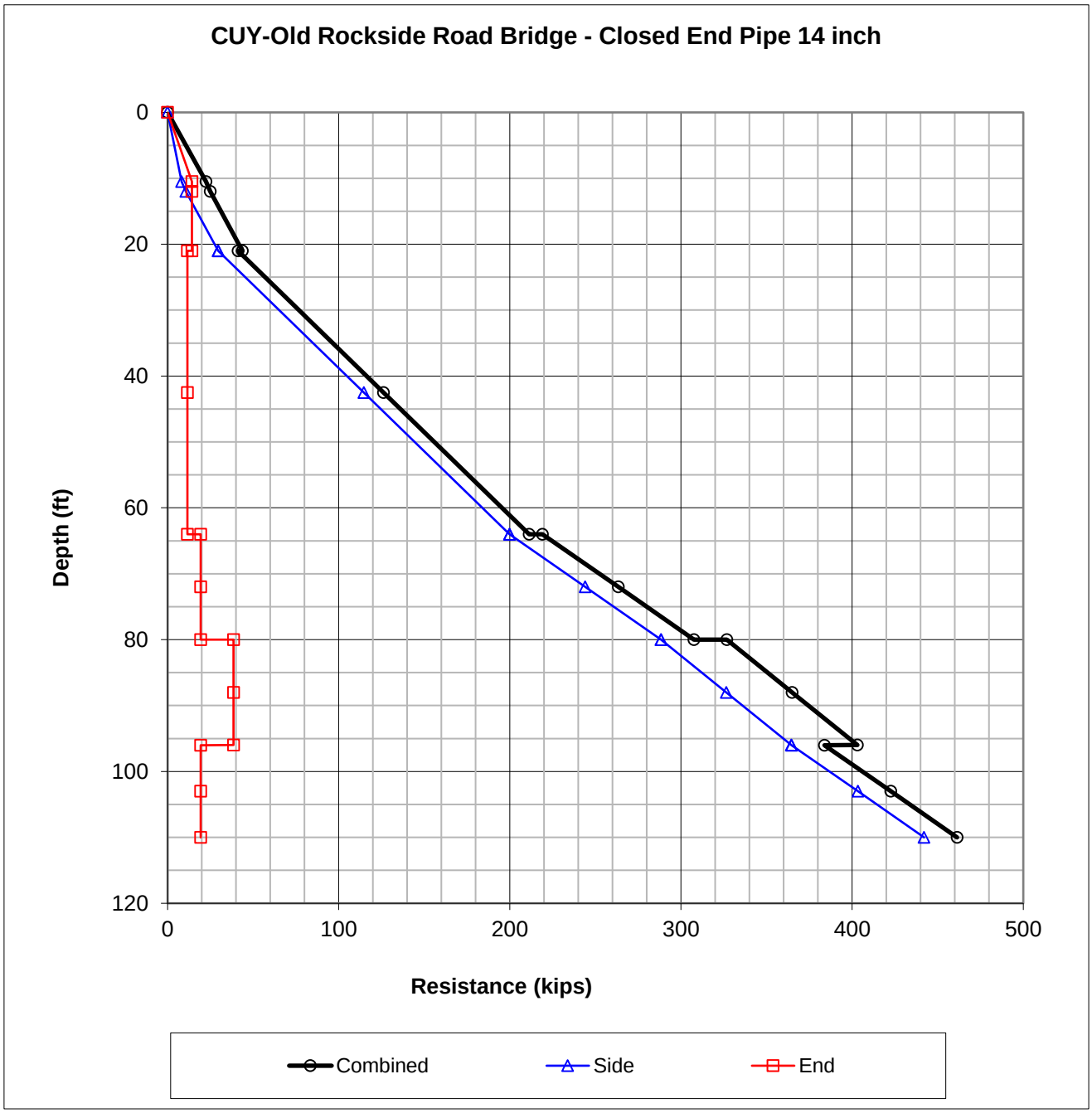
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	605
Depth of Pile (ft)	0.0
Depth to Water (ft)	12.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	21	30	30	0	120	1
21	64	0	0	1200	130	1
64	80	0	0	2000	130	1
80	96	0	0	4000	135	1
96	110	0	0	2000	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Ultimate
Date:	8/24/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Bridge Rear Abutment, B-002 - Ultimate
Date:	8/24/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	No scour or downdrag conditions
Depths & Elevations	Ground elev = 605 feet, Water = 12 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
10.50	630	1260	1.16	0.85	20.1	0.58	30	1260	23	14	18.0	0	8	14	22
12.00	1350	1440	1.16	0.85	20.1	0.58	30	1440	27	14	18.0	0	11	14	25
20.99	1699	1958	1.16	0.85	20.1	0.58	30	1958	36	14	18.0	0	29	14	44
21.01	1958	1959	0.00	0.00	0.0	0.00	0	1959	0	0	54.9	1080	30	12	41
42.50	2685	3412	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1080	115	12	126
63.99	4138	4864	0.00	0.00	0.0	0.00	0	3000	0	0	54.9	1080	200	12	211
64.01	4865	4866	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	200	19	219
72.00	5136	5406	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	244	19	263
79.99	5676	5946	0.00	0.00	0.0	0.00	0	3000	0	0	68.6	1510	288	19	307
80.01	5947	5947	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	288	38	327
88.00	6237	6527	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	326	38	365
95.99	6817	7108	0.00	0.00	0.0	0.00	0	3000	0	0	82.3	1300	364	38	403
96.01	7108	7109	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	365	19	384
103.00	7345	7582	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	403	19	423
110.00	7818	8055	0.00	0.00	0.0	0.00	0	3000	0	0	94.3	1510	442	19	461

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Driving
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	Zero (scour or downdrag) ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Driving
Date:	8/25/2020

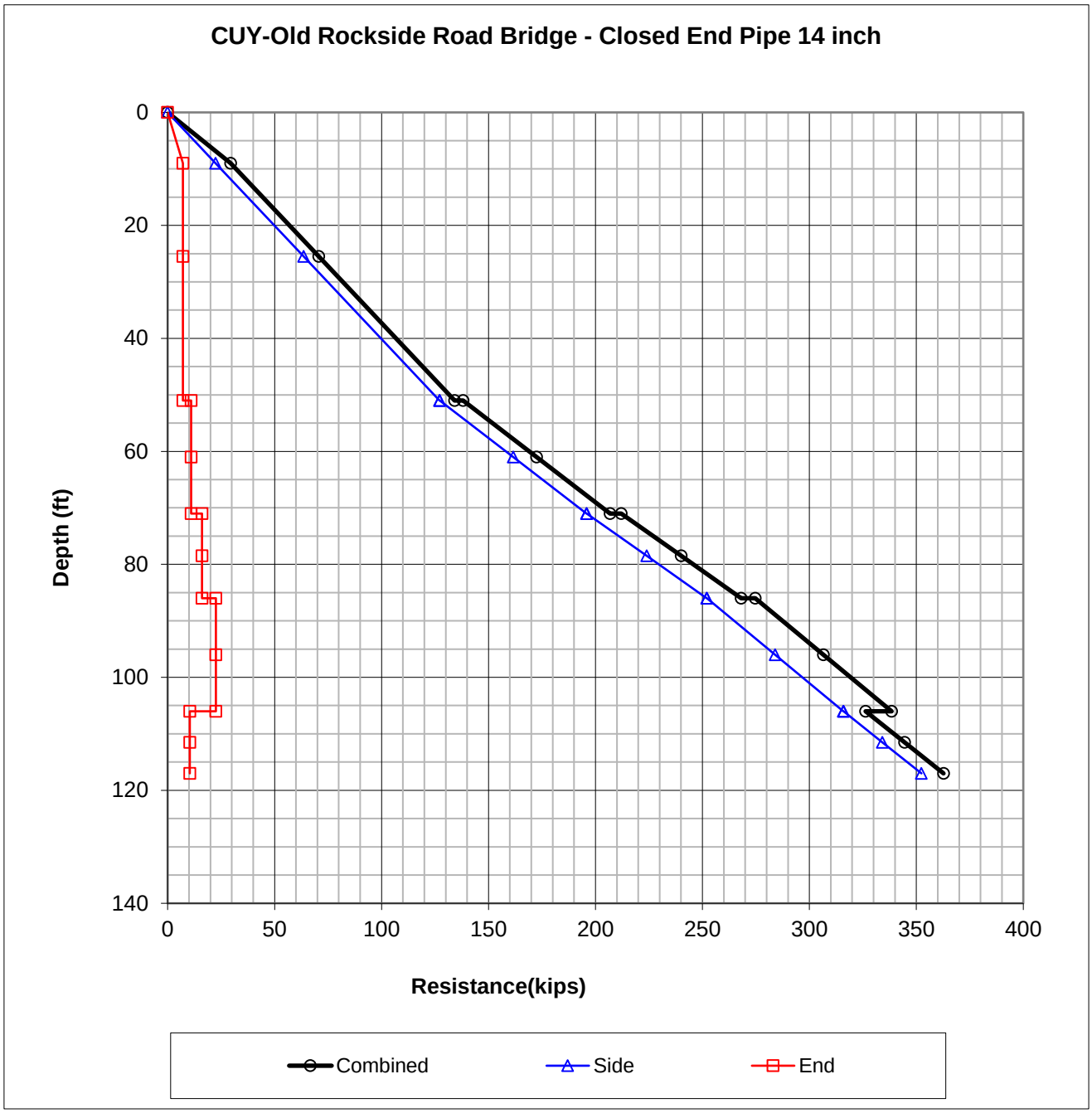
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	604
Depth of Pile (ft)	0.0
Depth to Water (ft)	9.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	51			1100	130	0.67
51	71			1700	130	0.67
71	86			2500	130	0.67
86	106			3500	135	0.67
106	117			1600	130	0.67

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Driving
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Driving
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	Zero capacity assumed to a depth of 0 feet
Depths & Elevations	Ground elev = 604 feet, Water = 9 feet, Pile = 0 feet

Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
9.00	585	1170	0.00	0.00	0.0	0.00	0	1170	0	0	43.7	1015	22	7	30
25.50	1728	2285	0.00	0.00	0.0	0.00	0	2285	0	0	43.7	1015	64	7	71
50.99	3147	4009	0.00	0.00	0.0	0.00	0	3000	0	0	43.7	1015	127	7	134
51.01	4009	4010	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	127	11	138
61.00	4348	4685	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	162	11	172
70.99	5023	5361	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	196	11	207
71.01	5361	5362	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	196	16	212
78.50	5615	5868	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	224	16	240
85.99	6121	6375	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	252	16	268
86.01	6375	6376	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	252	23	275
96.00	6739	7101	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	284	23	307
105.99	7464	7826	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	316	23	338
106.01	7827	7828	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	316	10	326
111.50	8013	8199	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	334	10	344
117.00	8385	8571	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	352	10	363

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

PILE INFORMATION

○ H-Pile	Piles are limited to H-piles and closed-end, steel pipe piles. First select the toggle button (H-Pile or Closed End Pipe Pile) that you wish to analyze. Then select the appropriate size.
HP14X117 ▼	
◉ Closed end Pipe Pile	
Outer Diameter (in) =	14
Pile Type:	Pipe Pile
Pipe Diameter (in)	14
End Type:	Closed End ▼
End Area (in^2):	153.9
Perimeter Type:	Actual ▼
Perimeter Unit Length (in):	44.0

ADVANCED OPTIONS FOR SCOUR AND DOWNDRAG

Advanced Options	Zero (scour or downdrag) ▼
Depth of Option (ft):	0.0

PROGRAM EXECUTION

Calculate/Update	Click to perform analysis (after defining soil profile).

Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

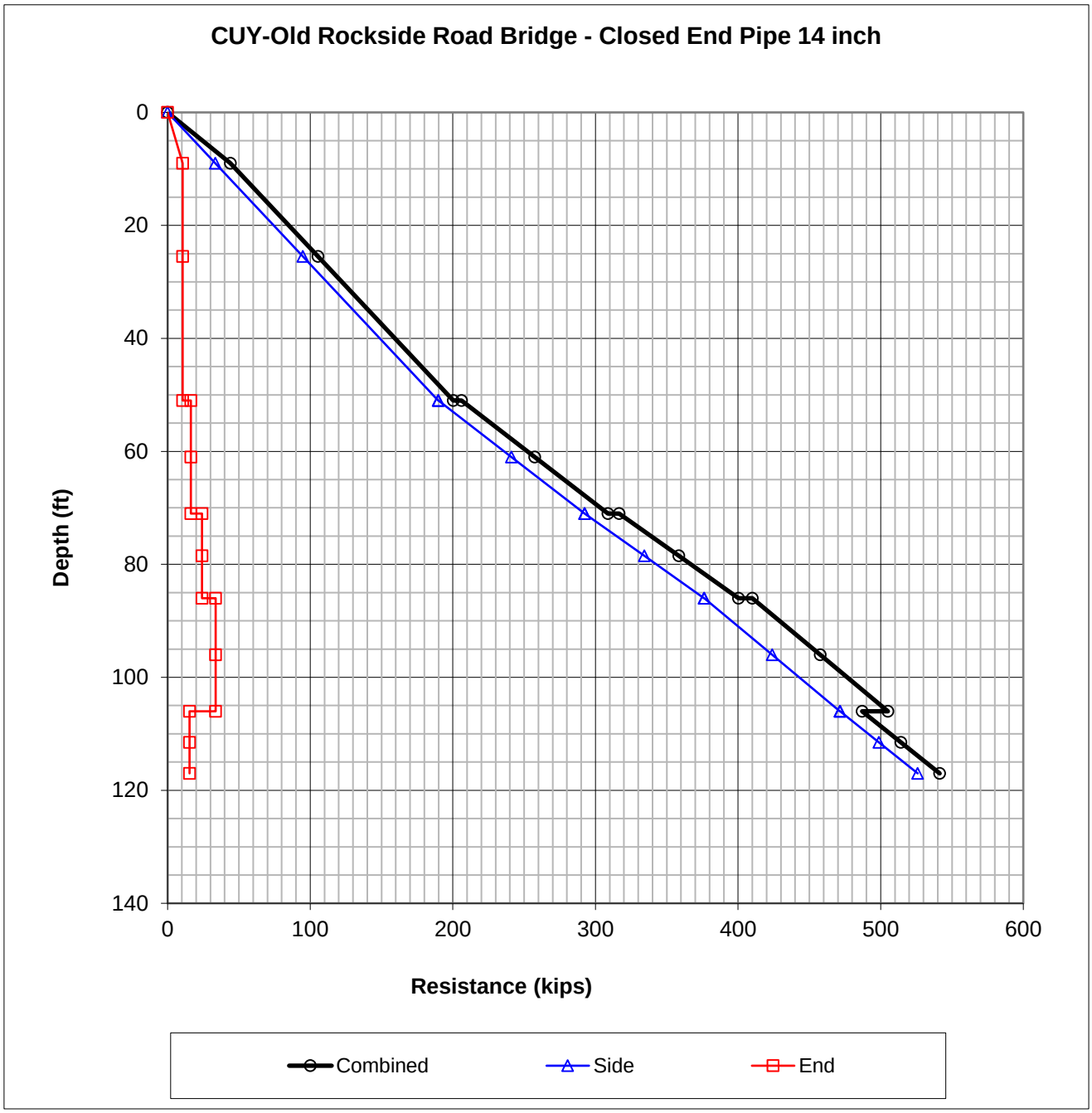
SOIL PROFILE AND RELATED INFORMATION

Elevation of Ground Surface (ft)	604
Depth of Pile (ft)	0.0
Depth to Water (ft)	9.0

Top (ft)	Bottom (ft)	ϕ – side	ϕ – end	s_u (psf)	γ (pcf)	Resistance Factor
0	51			1100	130	1
51	71			1700	130	1
71	86			2500	130	1
86	106			3500	135	1
106	117			1600	130	1

Driven Pile Capacity

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Ultimate
Date:	8/25/2020



Driven Pile Capacity

PROJECT INFORMATION

Project Name:	CUY-Old Rockside Road Bridge
Project Number:	N6175053
Notes:	Temporary Forward Abutment, B-004 - Ultimate
Date:	8/25/2020

SUMMARY OF KEY INPUT

Pile & Perimeter/Tip	Closed End Pipe 14 inch, Tip = Actual Area, Perimeter = Box
Tip (in^2) and Perm (in)	Tip = 153.9, Perimeter = 44
Advanced Options	Zero capacity assumed to a depth of 0 feet
Depths & Elevations	Ground elev = 604 feet, Water = 9 feet, Pile = 0 feet

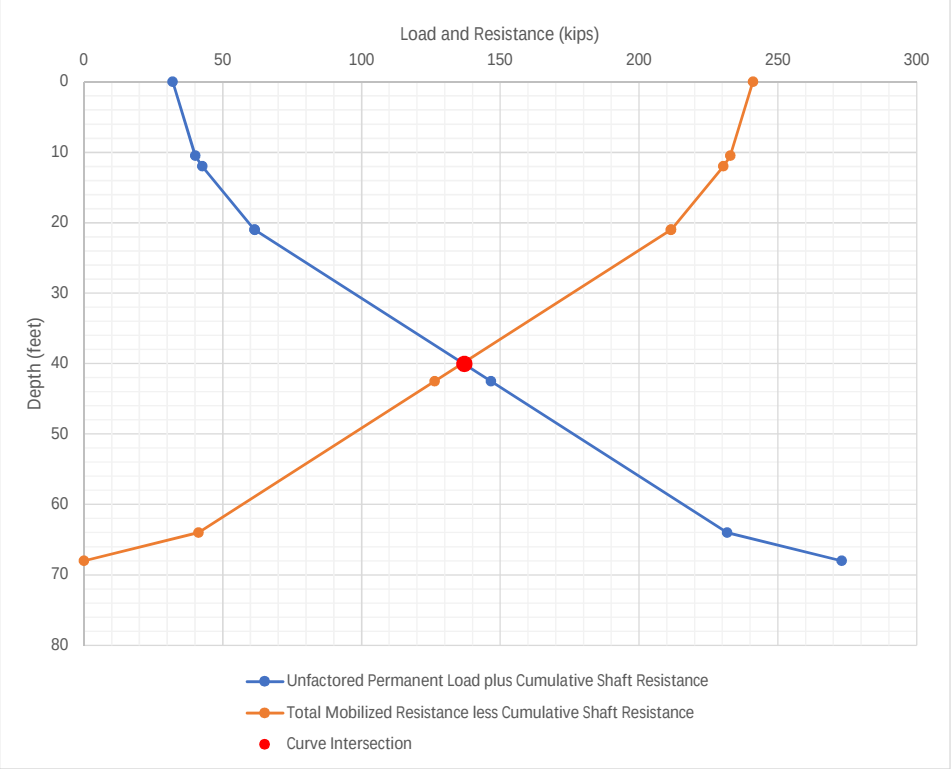
Depth (ft)	σ' at Midpoint (psf)	σ' at Tip (psf)	Coefficient of Lateral Stress (K_δ)	Correction Factor (C_f)	Pile-Soil Friction Angle (δ)	α	N'_q	Limiting σ' at Tip (psf)	Calculated End Bearing (kips)	Limiting End Bearing (kips)	d/B Ratio	Adhesion (psf)	Factored Shaft Resistance (kips)	Factored Tip Resistance (kips)	Factored Combined Resistance (kips)
9.00	585	1170	0.00	0.00	0.0	0.00	0	1170	0	0	43.7	1015	33	11	44
25.50	1728	2285	0.00	0.00	0.0	0.00	0	2285	0	0	43.7	1015	95	11	105
50.99	3147	4009	0.00	0.00	0.0	0.00	0	3000	0	0	43.7	1015	190	11	200
51.01	4009	4010	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	190	16	206
61.00	4348	4685	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	241	16	257
70.99	5023	5361	0.00	0.00	0.0	0.00	0	3000	0	0	60.9	1400	292	16	309
71.01	5361	5362	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	292	24	316
78.50	5615	5868	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	334	24	358
85.99	6121	6375	0.00	0.00	0.0	0.00	0	3000	0	0	73.7	1525	376	24	400
86.01	6375	6376	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	376	34	410
96.00	6739	7101	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	424	34	458
105.99	7464	7826	0.00	0.00	0.0	0.00	0	3000	0	0	90.9	1300	471	34	505
106.01	7827	7828	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	472	15	487
111.50	8013	8199	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	499	15	514
117.00	8385	8571	0.00	0.00	0.0	0.00	0	3000	0	0	100.3	1350	526	15	541

DOWNDRAG CALCULATIONS

Old Rockside Road Bridge
Downdrag Calculations
Rear Abutment (B-002), Front Pile Row

Depth (feet)	Unfactored Shaft Resistance, ΣR_s (kips)	Unfactored Permanent Load plus Shaft Resistance, ΣR_s+Q_d (kips)	Nominal Resistance Less Unfactored Shaft Resistance, R_n-R_s (kips)
0	0	32	241
11	8	40	233
12	11	43	230
21	29	61	212
21	30	62	211
43	115	147	126
64	200	232	41
68	241	273	0

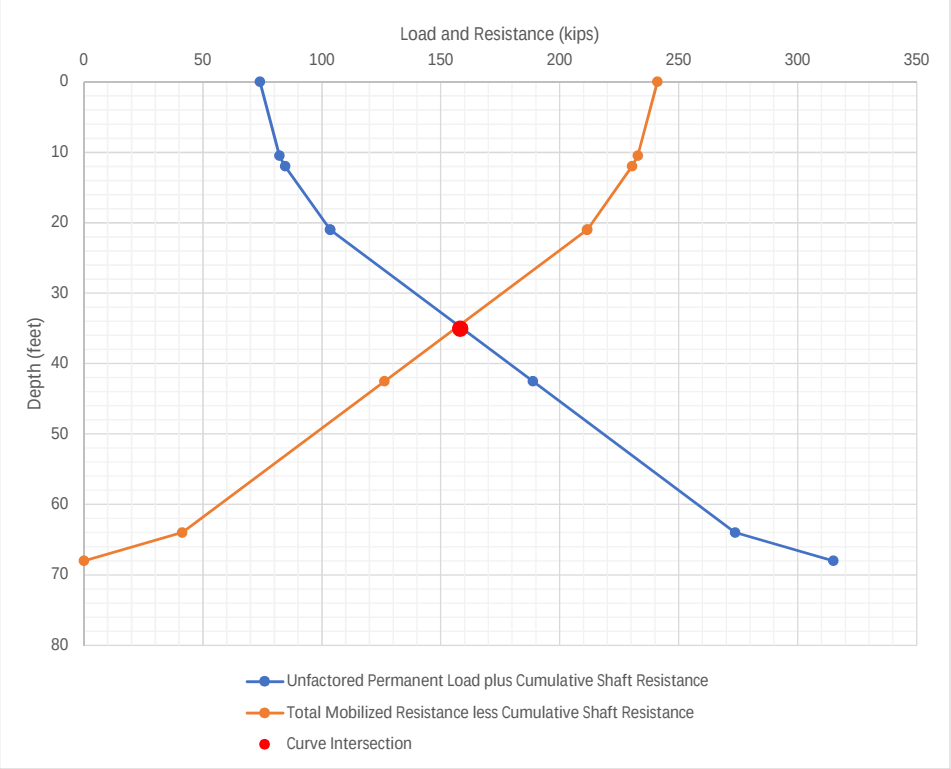
nominal pile resistance, R_n:	241	kips
unfactored permanent load, Q_d:	32	kips
intersection load:	137	kips
unfactored downdrag load, DD:	105	kips
neutral plane depth:	40	feet



Old Rockside Road Bridge
Downdrag Calculations
Rear Abutment (B-002), Back Pile Row

Depth (feet)	Unfactored Shaft Resistance, ΣR_s (kips)	Unfactored Permanent Load plus Shaft Resistance, ΣR_s+Q_d (kips)	Nominal Resistance Less Unfactored Shaft Resistance, R_n-R_s (kips)
0	0	74	241
11	8	82	233
12	11	85	230
21	29	103	212
21	30	104	211
43	115	189	126
64	200	274	41
68	241	315	0

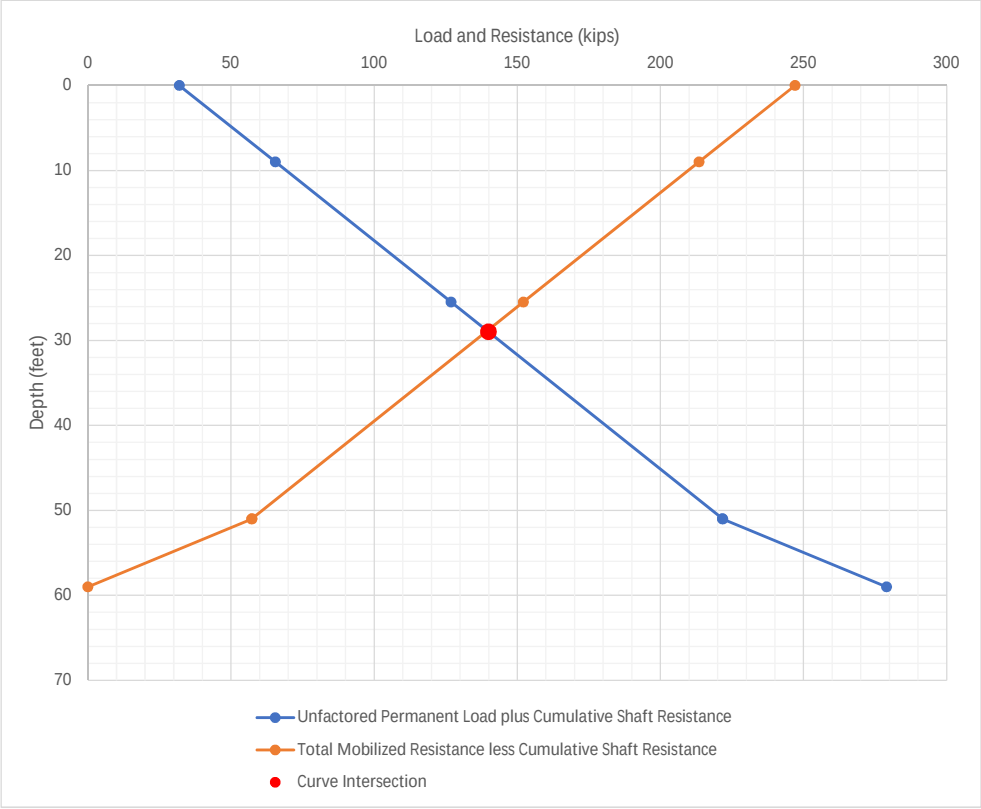
nominal pile resistance, R_n:	241	kips
unfactored permanent load, Q_d:	74	kips
intersection load:	158	kips
downdrag load, DD:	84	kips
neutral plane depth:	35	feet



Old Rockside Road Bridge
Downdrag Calculations
Forward Abutment (B-004), Front Pile Row

Depth (feet)	Unfactored Shaft Resistance, ΣR_s (kips)	Unfactored Permanent Load plus Shaft Resistance, ΣR_s+Q_d (kips)	Nominal Resistance Less Unfactored Shaft Resistance, R_n-R_s (kips)
0	0	32	247
9	33	65	214
26	95	127	152
51	190	222	57
51	190	222	57
59	247	279	0

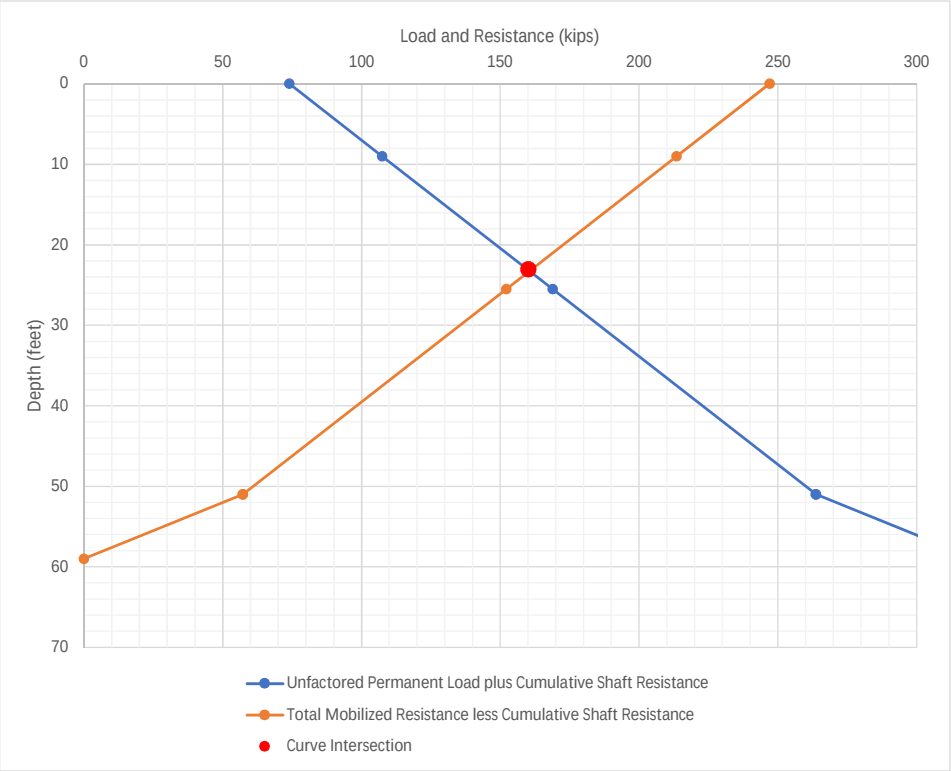
nominal pile resistance, R_n:	247	kips
unfactored permanent load, Q_d:	32	kips
intersection load:	140	kips
unfactored downdrag load, DD:	108	kips
neutral plane depth:	29	feet



Old Rockside Road Bridge
Downdrag Calculations
Forward Abutment (B-004), Back Pile Row

Depth (feet)	Unfactored Shaft Resistance, ΣR_s (kips)	Unfactored Permanent Load plus Shaft Resistance, ΣR_s+Q_d (kips)	Nominal Resistance Less Unfactored Shaft Resistance, R_n-R_s (kips)
0	0	74	247
9	33	107	214
26	95	169	152
51	190	264	57
51	190	264	57
59	247	321	0

nominal pile resistance, R_n:	247	kips
unfactored permanent load, Q_d:	74	kips
intersection load:	160	kips
unfactored downdrag load, DD:	86	kips
neutral plane depth:	23	feet

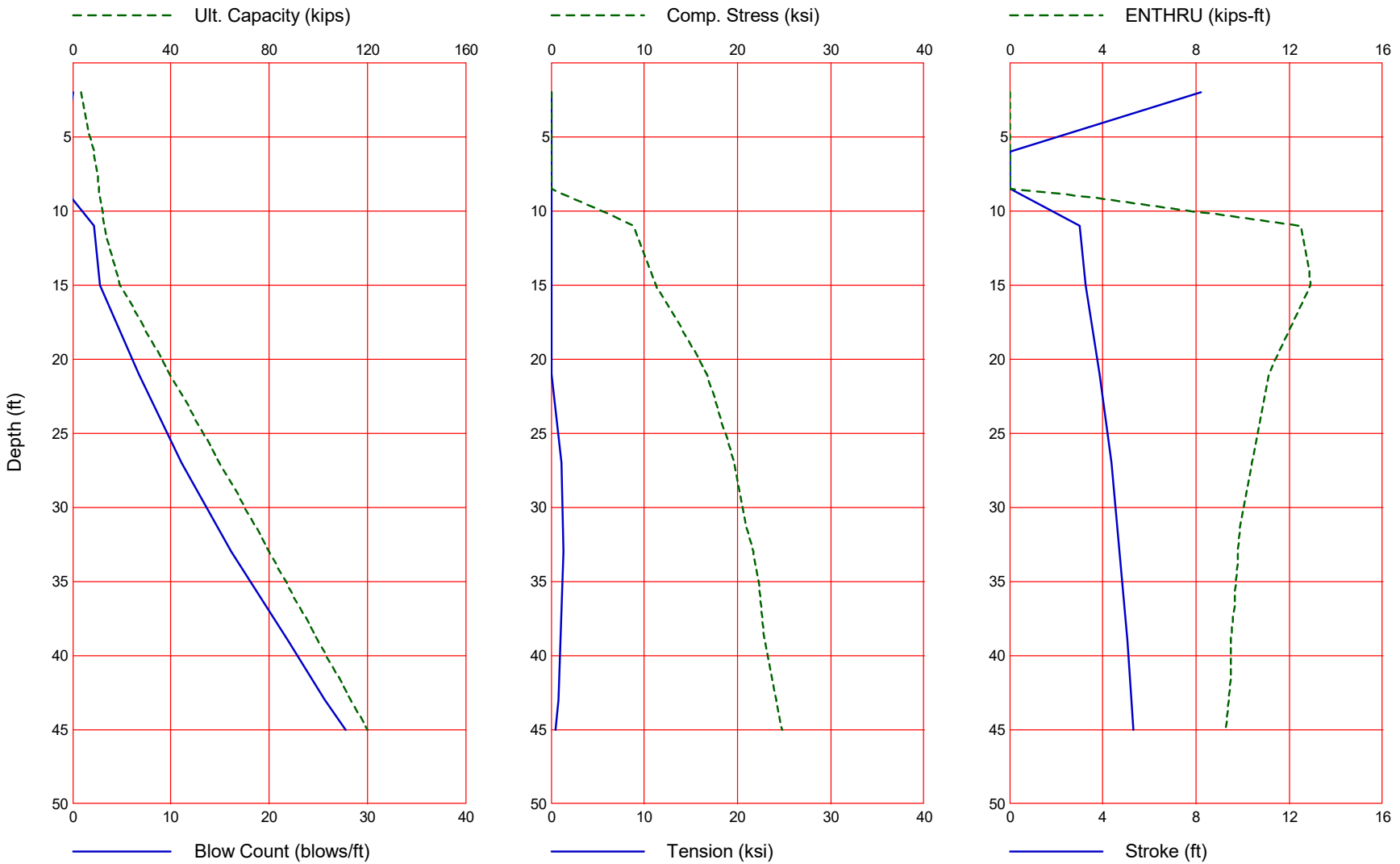


WEAP INPUTS AND RESULTS

Terracon Consultants, Inc
Rear Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	8.22	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	8.22	0.0
6.0	8.7	1.1	7.7	-1.0	0.000	0.000	0.00	0.0
8.5	10.6	2.1	8.5	-1.0	0.000	0.000	0.00	0.0
11.0	12.7	3.4	9.3	2.2	8.769	0.000	2.99	12.5
15.0	19.3	11.3	8.0	2.8	11.272	0.000	3.25	12.9
21.0	39.5	31.5	8.0	6.7	16.676	0.000	3.87	11.1
27.0	59.7	51.7	8.0	11.1	19.690	-1.099	4.38	10.4
33.0	79.8	71.8	8.0	16.2	21.675	-1.304	4.71	9.8
39.0	100.0	92.0	8.0	21.9	22.866	-1.062	5.04	9.5
43.0	113.4	105.4	8.0	25.7	24.120	-0.826	5.22	9.4
45.0	120.2	112.1	8.0	27.8	24.752	-0.521	5.31	9.3

Total Continuous Driving Time 8.00 minutes; Total Number of Blows 439 (starting at penetration 2.0 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

Input File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD BRIDGE - N6175053\1 - REAR ABUTMENT\REAR ABUTMENT.GWW
Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource \HAMMER2010.GW
Hammer File Version: 2003 (12/4/2018)

Input File Contents

Rear Abutment

OUT	OSG	HAM	STR	FUL	PEL	N	SPL	N-U	P-D	%SK	ISM	0	PHI	RSA	ITR	H-D	MXT	DEx
-100	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000

Pile g	Hammer g	Toe Area	Pile Size	Pile Type
32.185	32.185	113.090	12.000	Pipe

W Cp	A Cp	E Cp	T Cp	CoR	ROut	StCp
1.700	227.000	530.0	2.000	0.800	0.010	0.0

A Cu	E Cu	T Cu	CoR	ROut	StCu
0.000	0.0	0.000	0.000	0.000	0.0

LPle	APle	EPle	WPle	Peri	CI	CoR	ROut
50.000	9.22	29000.0	490.000	3.141	0	0.850	0.010

FFatigue	F0	0-Bottom
0	0.000	0.000

Manufac	Hmr Name	HmrType	No Seg-s
DELMAG	D 12	1	4

Ram Wt	Ram L	Ram Dia	MaxStrk	RtdStrk	Efficy
2.75	104.41	11.81	10.80	8.22	0.80

IB. Wt	IB. L	IB.Dia	IB CoR	IB RO
0.81	21.27	11.81	0.900	0.010

CompStrk	A Chamber	V Chamber	C Delay	C Duratn	Exp Coeff	VolCStart	Vol CEnd
11.07	109.60	97.00	0.0020	0.0020	1.250	0.00	0.00

P atm	P1	P2	P3	P4	P5
14.70	1380.00	0.00	0.00	0.00	0.00

Stroke	Effic.	Pressure	R-Weight	T-Delay	Exp-Coeff	Eps-Str	Total-AW
8.2200	0.8000	1380.0000	0.0000	0.0000	0.0000	0.0100	0.0000

Qs	Qt	Js	Jt	Qx	Jx	Rati	Dept
0.100	0.150	0.150	0.150	0.000	0.000	0.000	0.000

Research Soil Model: Atoe, Plug, Gap, Q-fac

0.000	0.000	0.000	0.000

Research Soil Model: RD-skn: m, d, toe: m, d

0.000	0.000	0.000	0.000

Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-

```
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt    SU F
LimL    TSf0
    0.00    0.00      0.00    0.00    0.20    0.10    0.15   1.20
6.00  24.000
    4.00    0.08      6.99    0.10    0.20    0.10    0.15   1.20
6.00  24.000
    4.00    0.08      6.99    0.10    0.20    0.10    0.15   1.20
6.00  24.000
   13.00    0.21      9.97    0.10    0.20    0.10    0.15   1.20
6.00  24.000
   13.00    1.07      8.01    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   50.00    1.07      8.01    0.10    0.14    0.15    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   1.00000   1.00000   1.00000   1.00000
   1.00000   1.00000   1.00000   1.00000   1.00000
      Dpth          L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      2.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      2.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      6.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      8.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     11.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     15.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     21.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     27.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     33.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     39.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     43.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     45.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      0.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Rear Abutment

Hammer Model: D 12 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	0.688				
2	0.688	121704.2	1.000	0.0000	
3	0.688	121704.2	1.000	0.0000	
4	0.688	121704.2	1.000	0.0000	
Imp Block	0.810	67059.7	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	5.2
Combined Pile Top		6684.5			

HAMMER OPTIONS:
Hammer File ID No. 3 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 2.75 Ram Length (inch) 104.41
Maximum Stroke (ft) 10.80
Rated Stroke (ft) 8.22 Efficiency 0.800

Maximum Pressure (psi) 1380.00 Actual Pressure (psi) 1380.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 11.81
Combustion Delay (s) 0.00200 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

```
  Elastic-Modulus      (ksi)     530.0  Elastic-Modulus
(ksi)       0.0
  Thickness           (inch)      2.00  Thickness
(inch)      0.00
  Coeff of Restitution             0.8  Coeff of Restitution
1.0
  RoundOut              (ft)       0.0  RoundOut
(ft)       0.0
  Stiffness        (kips/in)   60155.0  Stiffness
(kips/in)       0.0
```

Depth (ft) 2.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index ft/s	Wave Sp k/ft/s	EA/c
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 3.6

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	0.1	0.100	0.100	50.00	3.1	9.2
Toe						3.5	0.150	0.200			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.323
Driveability Analysis
Soil Damping Option Smith
Max No Analysis Iterations 0 Time Increment/Critical

```
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      2.00      8.22      1.00     0.800


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      4.1      3.6
  Hammer+Pile Weight > Rult: Pile Runs


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      4.1      3.6
  Hammer+Pile Weight > Rult: Pile Runs


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      4.1      3.6
  Hammer+Pile Weight > Rult: Pile Runs


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      4.1      3.6
  Hammer+Pile Weight > Rult: Pile Runs


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      4.1      3.6
  Hammer+Pile Weight > Rult: Pile Runs
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Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
3.6	0.0	8.22	0.00	0.00	1	0	0.00	1	0	0.0	89.1
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6

Rear Abutment
05/19/2021
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Version 2010

Depth (ft) 2.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 3.6

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	0.1	0.100	0.100	50.00	3.1	9.2
Toe						3.5	0.150	0.200			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
2.00	8.22	1.00	0.800

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 4.1 3.6
Hammer+Pile Weight > Rult: Pile Runs

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 4.1 3.6
Hammer+Pile Weight > Rult: Pile Runs

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 4.1 3.6
Hammer+Pile Weight > Rult: Pile Runs

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 4.1 3.6
Hammer+Pile Weight > Rult: Pile Runs

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 4.1 3.6
Hammer+Pile Weight > Rult: Pile Runs

Rear Abutment
05/19/2021
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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
3.6	0.0	8.22	0.00	0.00	1	0	0.00	1	0	0.0	89.1
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6
3.6	0.0	10.80	0.00	0.00	1	0	0.00	1	0	0.0	76.6

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 6.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 8.7

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
14	0.105	6685	0.000	0.000	1.00	0.2	0.100	0.100	46.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	0.9	0.100	0.100	50.00	3.1	9.2
Toe						7.7	0.150	0.200			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
6.00	8.22	1.00	0.800

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
8.7	Hammer did not run										
8.7	Hammer did not run										
8.7	Hammer did not run										
8.7	Hammer did not run										
8.7	Hammer did not run										

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 8.5 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 10.6

No.	Weight LbTop kips	Stiffn Perim k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Area ft	ft	in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
13	0.105	6685	0.000	0.000	1.00	0.1	0.100	0.100	43.33	3.1	9.2
14	0.105	6685	0.000	0.000	1.00	0.7	0.100	0.100	46.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	1.3	0.100	0.100	50.00	3.1	9.2
Toe						8.5	0.150	0.200			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
8.50	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
10.6	Hammer did not run									
10.6	Hammer did not run									
10.6	Hammer did not run									
10.6	Hammer did not run									
10.6	Hammer did not run									

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 11.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 12.7

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
12	0.105	6685	0.000	0.000	1.00	0.0	0.100	0.100	40.00	3.1	9.2
13	0.105	6685	0.000	0.000	1.00	0.6	0.100	0.100	43.33	3.1	9.2
14	0.105	6685	0.000	0.000	1.00	1.1	0.100	0.100	46.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	1.6	0.100	0.100	50.00	3.1	9.2
Toe						9.3	0.150	0.200		

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

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11.00       8.22       1.00       0.800
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Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
12.7	2.2	2.99	2.97	0.00	1	0	8.77	1	7	12.5 68.5
12.7	2.2	2.99	2.97	0.00	1	0	8.77	1	7	12.5 68.5
12.7	2.2	2.99	2.97	0.00	1	0	8.77	1	7	12.5 68.5
12.7	2.2	2.99	2.97	0.00	1	0	8.77	1	7	12.5 68.5
12.7	2.2	2.99	2.97	0.00	1	0	8.77	1	7	12.5 68.5

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 15.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 19.3

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
11	0.105	6685	0.000	0.000	1.00	0.1	0.100	0.100	36.67	3.1	9.2
12	0.105	6685	0.000	0.000	1.00	0.7	0.100	0.100	40.00	3.1	9.2
13	0.105	6685	0.000	0.000	1.00	1.2	0.100	0.100	43.33	3.1	9.2
14	0.105	6685	0.000	0.000	1.00	1.7	0.100	0.100	46.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	7.6	0.144	0.100	50.00	3.1	9.2
Toe						8.0	0.150	0.140		

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
15.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t kip-ft	b/min
19.3	2.8	3.25	3.27	0.00	1	0	11.27	1	2	12.9 65.6
19.3	2.8	3.25	3.27	0.00	1	0	11.27	1	2	12.9 65.6
19.3	2.8	3.25	3.27	0.00	1	0	11.27	1	2	12.9 65.6
19.3	2.8	3.25	3.27	0.00	1	0	11.27	1	2	12.9 65.6
19.3	2.8	3.25	3.27	0.00	1	0	11.27	1	2	12.9 65.6

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 21.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 39.5

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
9	0.105	6684	0.000	0.000	1.00	0.0	0.100	0.100	30.00	3.1	9.2
10	0.105	6684	0.000	0.000	1.00	0.6	0.100	0.100	33.33	3.1	9.2
11	0.105	6685	0.000	0.000	1.00	1.1	0.100	0.100	36.67	3.1	9.2
12	0.105	6685	0.000	0.000	1.00	1.6	0.100	0.100	40.00	3.1	9.2
13	0.105	6685	0.000	0.000	1.00	5.7	0.139	0.100	43.33	3.1	9.2
14	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	46.67	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	50.00	3.1	9.2
Toe						8.0	0.150	0.140			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
21.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t kip-ft	b/min
39.5	6.7	3.87	3.90	0.00	1	0	16.68	10	4	11.1 60.1
39.5	6.7	3.87	3.90	0.00	1	0	16.68	10	4	11.1 60.1
39.5	6.7	3.87	3.90	0.00	1	0	16.68	10	4	11.1 60.1
39.5	6.7	3.87	3.90	0.00	1	0	16.68	10	4	11.1 60.1
39.5	6.7	3.87	3.90	0.00	1	0	16.68	10	4	11.1 60.1

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 27.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.
50.0	9.22	29000.	490.0	3.1	0	16558.

EA/c
k/ft/s
16.1
16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 59.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	
LbTop	Perim	Area							
	kips	k/in	ft	ft		kips	s/ft	inch	
ft	ft	in2							
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	
3.33	3.1	9.2							
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	
6.67	3.1	9.2							
7	0.105	6684	0.000	0.000	1.00	0.0	0.100	0.100	
23.33	3.1	9.2							
8	0.105	6684	0.000	0.000	1.00	0.4	0.100	0.100	
26.67	3.1	9.2							
9	0.105	6684	0.000	0.000	1.00	1.0	0.100	0.100	
30.00	3.1	9.2							
10	0.105	6684	0.000	0.000	1.00	1.5	0.100	0.100	
33.33	3.1	9.2							
11	0.105	6685	0.000	0.000	1.00	3.8	0.129	0.100	
36.67	3.1	9.2							
12	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	
40.00	3.1	9.2							
15	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	
50.00	3.1	9.2							
Toe						8.0	0.150	0.140	

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
27.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
59.7	11.1	4.38	4.36	-1.10	10	41	19.69	11	4	10.4	56.5
59.7	11.1	4.38	4.36	-1.10	10	41	19.69	11	4	10.4	56.5
59.7	11.1	4.38	4.36	-1.10	10	41	19.69	11	4	10.4	56.5
59.7	11.1	4.38	4.36	-1.10	10	41	19.69	11	4	10.4	56.5
59.7	11.1	4.38	4.36	-1.10	10	41	19.69	11	4	10.4	56.5

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 33.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 79.8

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
6	0.105	6684	0.000	0.000	1.00	0.3	0.100	0.100	20.00	3.1	9.2
7	0.105	6684	0.000	0.000	1.00	0.9	0.100	0.100	23.33	3.1	9.2
8	0.105	6684	0.000	0.000	1.00	1.4	0.100	0.100	26.67	3.1	9.2
9	0.105	6684	0.000	0.000	1.00	1.9	0.100	0.100	30.00	3.1	9.2
10	0.105	6684	0.000	0.000	1.00	11.2	0.150	0.100	33.33	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	50.00	3.1	9.2
Toe						8.0	0.150	0.140			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
33.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Rt kip-ft	Bl/min
79.8	16.2	4.71	4.75	-1.30	10	34	21.67	10	4	9.8	54.3
79.8	16.2	4.71	4.75	-1.30	10	34	21.67	10	4	9.8	54.3
79.8	16.2	4.71	4.75	-1.30	10	34	21.67	10	4	9.8	54.3
79.8	16.2	4.71	4.75	-1.30	10	34	21.67	10	4	9.8	54.3
79.8	16.2	4.71	4.75	-1.30	10	34	21.67	10	4	9.8	54.3

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 39.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
50.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 100.0

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
4	0.105	6685	0.000	0.000	1.00	0.2	0.100	0.100	13.33	3.1	9.2
5	0.105	6685	0.000	0.000	1.00	0.8	0.100	0.100	16.67	3.1	9.2
6	0.105	6684	0.000	0.000	1.00	1.3	0.100	0.100	20.00	3.1	9.2
7	0.105	6684	0.000	0.000	1.00	1.8	0.100	0.100	23.33	3.1	9.2
8	0.105	6684	0.000	0.000	1.00	9.4	0.148	0.100	26.67	3.1	9.2
9	0.105	6684	0.000	0.000	1.00	11.2	0.150	0.100	30.00	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	50.00	3.1	9.2
Toe						8.0	0.150	0.140			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
39.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
100.0	21.9	5.04	5.05	-1.06	7	29	22.87	8	3	9.5 52.6
100.0	21.9	5.04	5.05	-1.06	7	29	22.87	8	3	9.5 52.6
100.0	21.9	5.04	5.05	-1.06	7	29	22.87	8	3	9.5 52.6
100.0	21.9	5.04	5.05	-1.06	7	29	22.87	8	3	9.5 52.6
100.0	21.9	5.04	5.05	-1.06	7	29	22.87	8	3	9.5 52.6

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 43.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558. 16.1
50.0	9.22	29000.	490.0	3.1	0	16558. 16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 113.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2	0.105	6685	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.1	9.2
3	0.105	6685	0.000	0.000	1.00	0.3	0.100	0.100	10.00	3.1	9.2
4	0.105	6685	0.000	0.000	1.00	0.9	0.100	0.100	13.33	3.1	9.2
5	0.105	6685	0.000	0.000	1.00	1.4	0.100	0.100	16.67	3.1	9.2
6	0.105	6684	0.000	0.000	1.00	1.9	0.100	0.100	20.00	3.1	9.2
7	0.105	6684	0.000	0.000	1.00	11.2	0.150	0.100	23.33	3.1	9.2
15	0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	50.00	3.1	9.2
Toe						8.0	0.150	0.140			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
43.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
113.4	25.7	5.22	5.23	-0.83	6	27	24.12	2	6	9.4 51.7
113.4	25.7	5.22	5.23	-0.83	6	27	24.12	2	6	9.4 51.7
113.4	25.7	5.22	5.23	-0.83	6	27	24.12	2	6	9.4 51.7
113.4	25.7	5.22	5.23	-0.83	6	27	24.12	2	6	9.4 51.7
113.4	25.7	5.22	5.23	-0.83	6	27	24.12	2	6	9.4 51.7

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 45.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558. 16.1
50.0	9.22	29000.	490.0	3.1	0	16558. 16.1

Wave Travel Time 2L/c (ms) 6.039

Pile and Soil Model Total Capacity Rut
(kips) 120.2

No. Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1 0.105	6685	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.1	9.2
2 0.105	6685	0.000	0.000	1.00	0.1	0.100	0.100	6.67	3.1	9.2
3 0.105	6685	0.000	0.000	1.00	0.7	0.100	0.100	10.00	3.1	9.2
4 0.105	6685	0.000	0.000	1.00	1.2	0.100	0.100	13.33	3.1	9.2
5 0.105	6685	0.000	0.000	1.00	1.7	0.100	0.100	16.67	3.1	9.2
6 0.105	6684	0.000	0.000	1.00	7.6	0.144	0.100	20.00	3.1	9.2
7 0.105	6684	0.000	0.000	1.00	11.2	0.150	0.100	23.33	3.1	9.2
15 0.105	6685	0.000	0.000	1.00	11.2	0.150	0.100	50.00	3.1	9.2
Toe					8.0	0.150	0.140			

1.569 kips total unreduced pile weight (g= 32.17 ft/s2)
1.569 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
45.00	8.22	1.00	0.800

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct Bl Rt	Stroke (ft)		Ten Str	i	t	Comp Str	i	t
kips	b/ft	down	up	ksi			ksi		
120.2	27.8	5.31	5.31	-0.52	5	27	24.75	2	6
kip-ft	b/min								
9.3	51.2								
120.2	27.8	5.31	5.31	-0.52	5	27	24.75	2	6
9.3	51.2								
120.2	27.8	5.31	5.31	-0.52	5	27	24.75	2	6
9.3	51.2								
120.2	27.8	5.31	5.31	-0.52	5	27	24.75	2	6
9.3	51.2								
120.2	27.8	5.31	5.31	-0.52	5	27	24.75	2	6
9.3	51.2								

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	8.22	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	8.22	0.0
6.0	8.7	1.1	7.7	Hammer did not run				
8.5	10.6	2.1	8.5	Hammer did not run				
11.0	12.7	3.4	9.3	2.2	8.769	0.000	2.99	12.5
15.0	19.3	11.3	8.0	2.8	11.272	0.000	3.25	12.9
21.0	39.5	31.5	8.0	6.7	16.676	0.000	3.87	11.1
27.0	59.7	51.7	8.0	11.1	19.690	-1.099	4.38	10.4
33.0	79.8	71.8	8.0	16.2	21.675	-1.304	4.71	9.8
39.0	100.0	92.0	8.0	21.9	22.866	-1.062	5.04	9.5
43.0	113.4	105.4	8.0	25.7	24.120	-0.826	5.22	9.4
45.0	120.2	112.1	8.0	27.8	24.752	-0.521	5.31	9.3

Total Driving Time 8 minutes; Total No. of Blows 439
Starting at penetration 2.0 ft

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
6.0	8.7	1.1	7.7	Hammer did not run				
8.5	10.6	2.1	8.5	Hammer did not run				
11.0	12.7	3.4	9.3	2.2	8.769	0.000		

```
2.99      12.5
      15.0      19.3      11.3       8.0      2.8  11.272   0.000
3.25      12.9
      21.0      39.5      31.5       8.0      6.7  16.676   0.000
3.87      11.1
      27.0      59.7      51.7       8.0     11.1  19.690  -1.099
4.38      10.4
      33.0      79.8      71.8       8.0     16.2  21.675  -1.304
4.71       9.8
      39.0     100.0      92.0       8.0     21.9  22.866  -1.062
5.04       9.5
      43.0     113.4     105.4       8.0     25.7  24.120  -0.826
5.22       9.4
      45.0     120.2     112.1       8.0     27.8  24.752  -0.521
5.31       9.3

Total Driving Time       8 minutes;            Total No. of Blows
439
Starting at penetration     2.0 ft
```

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
6.0	8.7	1.1	7.7	Hammer did not run				
8.5	10.6	2.1	8.5	Hammer did not run				
11.0	12.7	3.4	9.3	2.2	8.769	0.000	2.99	12.5
15.0	19.3	11.3	8.0	2.8	11.272	0.000	3.25	12.9
21.0	39.5	31.5	8.0	6.7	16.676	0.000	3.87	11.1
27.0	59.7	51.7	8.0	11.1	19.690	-1.099	4.38	10.4
33.0	79.8	71.8	8.0	16.2	21.675	-1.304	4.71	9.8
39.0	100.0	92.0	8.0	21.9	22.866	-1.062	5.04	9.5
43.0	113.4	105.4	8.0	25.7	24.120	-0.826	5.22	9.4
45.0	120.2	112.1	8.0	27.8	24.752	-0.521	5.31	9.3

Total Driving Time 8 minutes; Total No. of Blows
439
Starting at penetration 2.0 ft

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
6.0	8.7	1.1	7.7	Hammer did not run				
8.5	10.6	2.1	8.5	Hammer did not run				
11.0	12.7	3.4	9.3	2.2	8.769	0.000		

2.99 12.5
15.0 19.3 11.3 8.0 2.8 11.272 0.000
3.25 12.9
21.0 39.5 31.5 8.0 6.7 16.676 0.000
3.87 11.1
27.0 59.7 51.7 8.0 11.1 19.690 -1.099
4.38 10.4
33.0 79.8 71.8 8.0 16.2 21.675 -1.304
4.71 9.8
39.0 100.0 92.0 8.0 21.9 22.866 -1.062
5.04 9.5
43.0 113.4 105.4 8.0 25.7 24.120 -0.826
5.22 9.4
45.0 120.2 112.1 8.0 27.8 24.752 -0.521
5.31 9.3

Total Driving Time 8 minutes; Total No. of Blows 439
Starting at penetration 2.0 ft

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
2.0	3.6	0.1	3.5	0.0	0.000	0.000	10.80	0.0
6.0	8.7	1.1	7.7	Hammer did not run				
8.5	10.6	2.1	8.5	Hammer did not run				
11.0	12.7	3.4	9.3	2.2	8.769	0.000	2.99	12.5
15.0	19.3	11.3	8.0	2.8	11.272	0.000	3.25	12.9
21.0	39.5	31.5	8.0	6.7	16.676	0.000	3.87	11.1
27.0	59.7	51.7	8.0	11.1	19.690	-1.099	4.38	10.4
33.0	79.8	71.8	8.0	16.2	21.675	-1.304	4.71	9.8
39.0	100.0	92.0	8.0	21.9	22.866	-1.062	5.04	9.5
43.0	113.4	105.4	8.0	25.7	24.120	-0.826	5.22	9.4
45.0	120.2	112.1	8.0	27.8	24.752	-0.521	5.31	9.3

Total Driving Time 8 minutes; Total No. of Blows 439
Starting at penetration 2.0 ft

Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Table of Depths Analyzed with Driving System Modifiers

Depth	Length	Temp. Wait Time	Equivalent Pressure Stroke	Ratio	Stiffn. Factor	Cushion Efficy. CoR
ft	ft	hr	ft			
2.00	50.00	0.00	8.22	1.00	0.80	1.00
2.00	50.00	0.00	8.22	1.00	0.80	1.00
6.00	50.00	0.00	8.22	1.00	0.80	1.00
8.50	50.00	0.00	8.22	1.00	0.80	1.00
11.00	50.00	0.00	8.22	1.00	0.80	1.00
15.00	50.00	0.00	8.22	1.00	0.80	1.00
21.00	50.00	0.00	8.22	1.00	0.80	1.00
27.00	50.00	0.00	8.22	1.00	0.80	1.00
33.00	50.00	0.00	8.22	1.00	0.80	1.00
39.00	50.00	0.00	8.22	1.00	0.80	1.00
43.00	50.00	0.00	8.22	1.00	0.80	1.00
45.00	50.00	0.00	8.22	1.00	0.80	1.00

Soil Layer Resistance Values

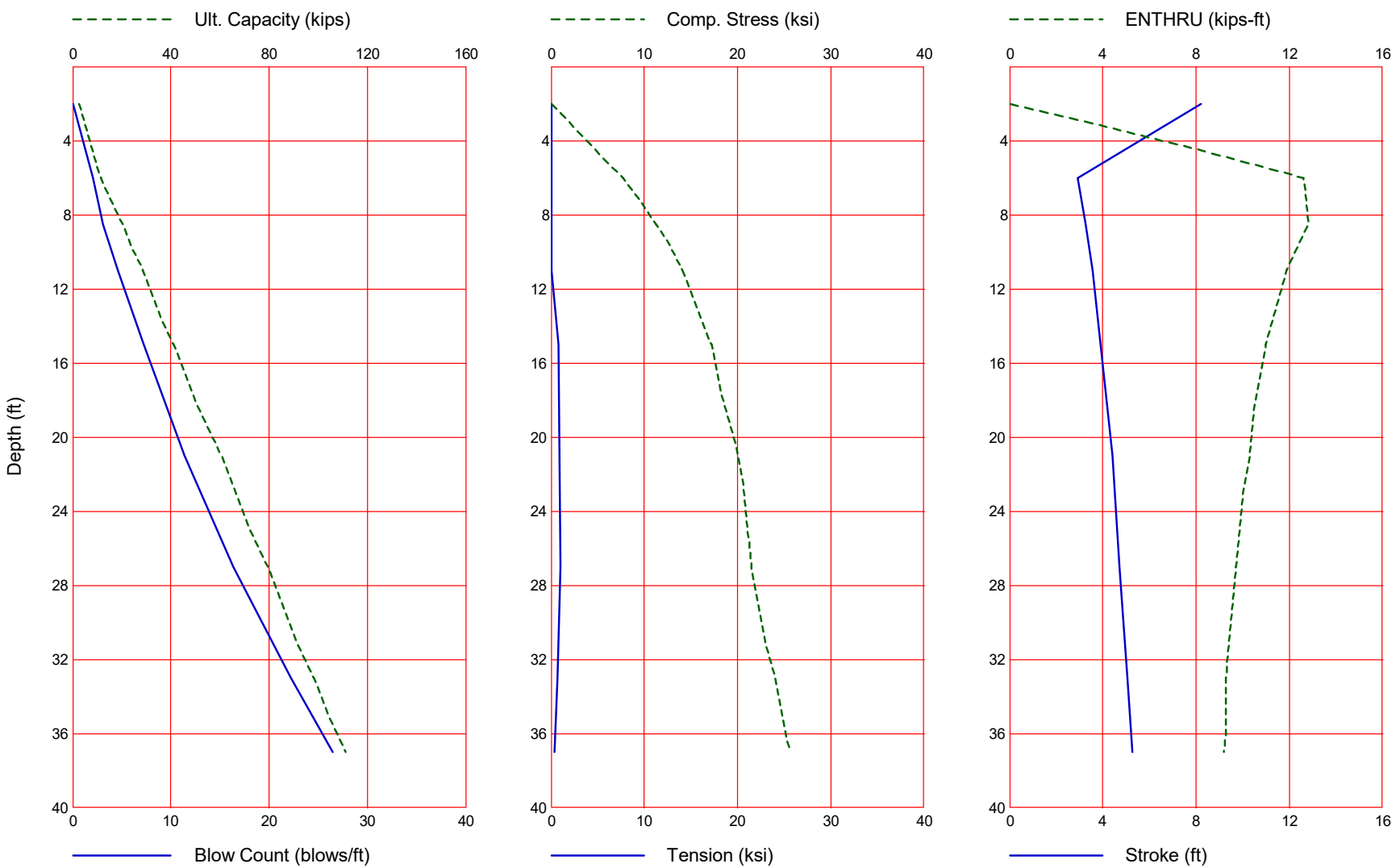
Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Setup Distance	Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	0.00	0.100	0.200	0.100	0.150	0.500	6.000	24.000
4.00	0.08	6.99	0.100	0.200	0.100	0.150	0.500	6.000	24.000

```
    4.00    0.08    6.99   0.100   0.200   0.100   0.150   0.500
6.000  24.000
   13.00    0.21    9.97   0.100   0.200   0.100   0.150   0.500
6.000  24.000
   13.00    1.07    8.01   0.100   0.140   0.150   0.150   1.000
6.000 168.000
   50.00    1.07    8.01   0.100   0.140   0.150   0.150   1.000
6.000 168.000
```

Terracon Consultants, Inc
Front Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
2.0	2.5	0.7	1.8	0.0	0.000	0.000	8.22	0.0
2.0	2.5	0.7	1.8	0.0	0.000	0.000	8.22	0.0
6.0	11.7	6.3	5.3	2.1	7.709	0.000	2.91	12.6
8.5	20.3	12.7	7.6	3.1	11.297	0.000	3.26	12.8
11.0	28.6	20.6	8.0	4.6	14.167	0.000	3.55	11.9
15.0	41.3	33.3	8.0	7.2	17.233	-0.804	3.92	11.0
21.0	60.4	52.3	8.0	11.4	20.061	-0.902	4.41	10.3
27.0	79.4	71.4	8.0	16.4	21.440	-0.984	4.73	9.7
33.0	98.4	90.4	8.0	22.2	24.093	-0.657	5.07	9.3
37.0	111.1	103.1	8.0	26.5	25.635	-0.377	5.28	9.2

Total Continuous Driving Time 7.00 minutes; Total Number of Blows 396 (starting at penetration 2.0 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

Input File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD BRIDGE - N6175053\2 - FRONT ABUTMENT\FRONT ABUTMENT.GWW
Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource \HAMMER2010.GW
Hammer File Version: 2003 (12/4/2018)

Input File Contents

Front Abutment

OUT	OSG	HAM	STR	FUL	PEL	N	SPL	N-U	P-D	%SK	ISM	0	PHI	RSA	ITR	H-D	MXT	DEx
-100	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000

Pile g	Hammer g	Toe Area	Pile Size	Pile Type
32.185	32.185	113.090	12.000	Pipe

W Cp	A Cp	E Cp	T Cp	CoR	ROut	StCp
1.700	227.000	530.0	2.000	0.800	0.010	0.0

A Cu	E Cu	T Cu	CoR	ROut	StCu
0.000	0.0	0.000	0.000	0.000	0.0

LPle	APle	EPle	WPle	Peri	CI	CoR	ROut
42.000	9.22	29000.0	490.000	3.141	0	0.850	0.010

FFatigue	F0	0-Bottom
0	0.000	0.000

Manufac	Hmr Name	HmrType	No Seg-s
DELMAG	D 12	1	4

Ram Wt	Ram L	Ram Dia	MaxStrk	RtdStrk	Efficy
2.75	104.41	11.81	10.80	8.22	0.80

IB. Wt	IB. L	IB.Dia	IB CoR	IB RO
0.81	21.27	11.81	0.900	0.010

CompStrk	A Chamber	V Chamber	C Delay	C Duratn	Exp Coeff	VolCStart	Vol CEnd
11.07	109.60	97.00	0.0020	0.0020	1.250	0.00	0.00

P atm	P1	P2	P3	P4	P5
14.70	1380.00	0.00	0.00	0.00	0.00

Stroke	Effic.	Pressure	R-Weight	T-Delay	Exp-Coeff	Eps-Str	Total-AW
8.2200	0.8000	1380.0000	0.0000	0.0000	0.0000	0.0100	0.0000

Qs	Qt	Js	Jt	Qx	Jx	Rati	Dept
0.100	0.100	0.200	0.150	0.000	0.000	0.000	0.000

Research Soil Model: Atoe, Plug, Gap, Q-fac

0.000	0.000	0.000	0.000

Research Soil Model: RD-skn: m, d, toe: m, d

0.000	0.000	0.000	0.000

Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-

```
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt    SU F
LimL    TSf0
    0.00    0.00      0.00    0.10    0.15    0.15    0.15   1.50
6.00 168.000
    9.00    1.01      8.01    0.10    0.15    0.15    0.15   1.50
6.00 168.000
    9.00    1.01      8.01    0.10    0.15    0.15    0.15   1.50
6.00 168.000
   42.00    1.01      8.01    0.10    0.15    0.15    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
      Dpth         L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      2.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      2.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      6.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      8.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     11.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     15.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     21.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     27.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     33.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     37.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      0.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Front Abutment

Hammer Model: D 12 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	0.688				
2	0.688	121704.2	1.000	0.0000	
3	0.688	121704.2	1.000	0.0000	
4	0.688	121704.2	1.000	0.0000	
Imp Block	0.810	67059.7	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	5.2
Combined Pile Top		6896.7			

HAMMER OPTIONS:
Hammer File ID No. 3 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 2.75 Ram Length (inch) 104.41
Maximum Stroke (ft) 10.80
Rated Stroke (ft) 8.22 Efficiency 0.800

Maximum Pressure (psi) 1380.00 Actual Pressure (psi) 1380.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 11.81
Combustion Delay (s) 0.00200 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

```
  Elastic-Modulus      (ksi)     530.0  Elastic-Modulus
(ksi)       0.0
  Thickness           (inch)      2.00  Thickness
(inch)      0.00
  Coeff of Restitution             0.8  Coeff of Restitution
1.0
  RoundOut              (ft)       0.0  RoundOut
(ft)       0.0
  Stiffness        (kips/in)   60155.0  Stiffness
(kips/in)       0.0
```

Depth (ft) 2.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L	b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft		in2	ksi	lb/ft3	ft		ft/s
0.0		9.22	29000.	490.0	3.1	0	16558.
42.0		9.22	29000.	490.0	3.1	0	16558.

EA/c
k/ft/s
16.1
16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 2.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
	kips	k/in	ft	ft		kips	s/ft	inch
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100
13	0.101	6897	0.000	0.000	1.00	0.7	0.150	0.100
Toe						1.8	0.150	0.150

LbTop Perim Area
ft ft in2
3.23 3.1 9.2
6.46 3.1 9.2
42.00 3.1 9.2

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.323
Driveability Analysis
Soil Damping Option Smith
Max No Analysis Iterations 0 Time Increment/Critical

```
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      2.00      8.22      1.00     0.800


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)     3.8     2.5
  Hammer+Pile Weight > Rult: Pile Runs
```

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
2.5	0.0	8.22	0.00	0.00	1	0	0.00	1	0	0.0	89.1

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 2.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 2.5

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1	9.2
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1	9.2
13	0.101	6897	0.000	0.000	1.00	0.7	0.150	0.100	42.00	3.1	9.2
Toe						1.8	0.150	0.150			

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
2.00	8.22	1.00	0.800

INITIAL STATIC ANALYSIS: Total Wt, Sum(R) 3.8 2.5
Hammer+Pile Weight > Rult: Pile Runs

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
2.5	0.0	8.22	0.00	0.00	1	0	0.00	1	0	0.0	89.1

```
 Front Abutment
05/19/2021
 Terracon Consultants, Inc                                    GRLWEAP
Version 2010

  Depth                  (ft)       6.0  Standard Soil Setup
  Shaft Gain/Loss Factor         1.000  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area              (in2)   113.090  Pile Type
Pipe
  Pile Size            (inch)    12.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0     9.22   29000.    490.0      3.1        0    16558.
16.1
      42.0     9.22   29000.    490.0      3.1        0    16558.
16.1

  Wave Travel Time 2L/c (ms)     5.073

         Pile and Soil Model            Total Capacity Rut
(kips)      11.7
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.101     6897 0.010 0.000 0.85     0.0   0.000 0.100
3.23   3.1     9.2
   2  0.101     6897 0.000 0.000 1.00     0.0   0.000 0.100
6.46   3.1     9.2
  12  0.101     6897 0.000 0.000 1.00     1.4   0.150 0.100
38.77   3.1     9.2
  13  0.101     6897 0.000 0.000 1.00     5.0   0.150 0.100
42.00   3.1     9.2
 Toe                                      5.3   0.150 0.150

      1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
      1.318 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      6.00      8.22      1.00     0.800
```

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
11.7	2.1	2.91	2.90	0.00	1	0	7.71	1	5	12.6 69.3

```
 Front Abutment
05/19/2021
 Terracon Consultants, Inc                                    GRLWEAP
Version 2010

  Depth                  (ft)       8.5  Standard Soil Setup
  Shaft Gain/Loss Factor         1.000  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area              (in2)   113.090  Pile Type
Pipe
  Pile Size            (inch)    12.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0     9.22   29000.    490.0      3.1        0    16558.
16.1
      42.0     9.22   29000.    490.0      3.1        0    16558.
16.1

  Wave Travel Time 2L/c (ms)     5.073

         Pile and Soil Model            Total Capacity Rut
(kips)      20.3
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.101     6897 0.010 0.000 0.85     0.0   0.000 0.100
3.23   3.1     9.2
   2  0.101     6897 0.000 0.000 1.00     0.0   0.000 0.100
6.46   3.1     9.2
  11  0.101     6897 0.000 0.000 1.00     0.7   0.150 0.100
35.54   3.1     9.2
  12  0.101     6897 0.000 0.000 1.00     4.2   0.150 0.100
38.77   3.1     9.2
  13  0.101     6897 0.000 0.000 1.00     7.8   0.150 0.100
42.00   3.1     9.2
 Toe                                       7.6   0.150 0.150

      1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
      1.318 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
       ft        ft     Ratio
     8.50      8.22      1.00     0.800
```

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
20.3	3.1	3.26	3.28	0.00	1	0	11.30	1	2	12.8	65.5

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 11.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 28.6

No.	Weight LbTop kips	Stiffn Perim k/in	Area in2	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	ft	ft
1	0.101	6897		0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1
2	0.101	6897		0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1
10	0.101	6897		0.000	0.000	1.00	0.3	0.150	0.100	32.31	3.1
11	0.101	6897		0.000	0.000	1.00	3.3	0.150	0.100	35.54	3.1
12	0.101	6897		0.000	0.000	1.00	7.0	0.150	0.100	38.77	3.1
13	0.101	6897		0.000	0.000	1.00	10.0	0.150	0.100	42.00	3.1
Toe							8.0	0.150	0.150		

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

```
11.00       8.22       1.00       0.800
```

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t kip-ft	b/min
28.6	4.6	3.55	3.58	0.00	1	0	14.17	1	2	11.9	62.7

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 15.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 41.3

No.	Weight LbTop kips	Stiffn Perim k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Area ft	ft	in2
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1	9.2
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1	9.2
9	0.101	6897	0.000	0.000	1.00	0.8	0.150	0.100	29.08	3.1	9.2
10	0.101	6897	0.000	0.000	1.00	4.2	0.150	0.100	32.31	3.1	9.2
11	0.101	6897	0.000	0.000	1.00	7.9	0.150	0.100	35.54	3.1	9.2
12	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	38.77	3.1	9.2
13	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	42.00	3.1	9.2
Toe						8.0	0.150	0.150			

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
15.00	8.22	1.00	0.800

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
41.3	7.2	3.92	3.95	-0.80	10	50	17.23	10	4	11.0 59.7

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 21.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 60.4

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	Area in2
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1	9.2
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1	9.2
7	0.101	6897	0.000	0.000	1.00	0.5	0.150	0.100	22.62	3.1	9.2
8	0.101	6897	0.000	0.000	1.00	3.7	0.150	0.100	25.85	3.1	9.2
9	0.101	6897	0.000	0.000	1.00	7.4	0.150	0.100	29.08	3.1	9.2
10	0.101	6897	0.000	0.000	1.00	10.1	0.150	0.100	32.31	3.1	9.2
11	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	35.54	3.1	9.2
13	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	42.00	3.1	9.2
Toe						8.0	0.150	0.150			

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
21.00	8.22	1.00	0.800

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
60.4	11.4	4.41	4.39	-0.90	8	39	20.06	8	3	10.3 56.2

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 27.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 79.4

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft in2
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1 9.2
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1 9.2
5	0.101	6897	0.000	0.000	1.00	0.2	0.150	0.100	16.15	3.1 9.2
6	0.101	6897	0.000	0.000	1.00	3.2	0.150	0.100	19.38	3.1 9.2
7	0.101	6897	0.000	0.000	1.00	6.8	0.150	0.100	22.62	3.1 9.2
8	0.101	6897	0.000	0.000	1.00	9.9	0.150	0.100	25.85	3.1 9.2
9	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	29.08	3.1 9.2
13	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	42.00	3.1 9.2
Toe						8.0	0.150	0.150		

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
27.00	8.22	1.00	0.800

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Rt kip-ft	b/min
79.4	16.4	4.73	4.77	-0.98	6	33	21.44	6	3	9.7	54.2

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 33.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 113.090 Pile Type
Pipe
Pile Size (inch) 12.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	9.22	29000.	490.0	3.1	0	16558.	16.1
42.0	9.22	29000.	490.0	3.1	0	16558.	16.1

Wave Travel Time 2L/c (ms) 5.073

Pile and Soil Model Total Capacity Rut
(kips) 98.4

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.101	6897	0.010	0.000	0.85	0.0	0.000	0.100	3.23	3.1	9.2
2	0.101	6897	0.000	0.000	1.00	0.0	0.000	0.100	6.46	3.1	9.2
3	0.101	6897	0.000	0.000	1.00	0.1	0.150	0.100	9.69	3.1	9.2
4	0.101	6897	0.000	0.000	1.00	2.6	0.150	0.100	12.92	3.1	9.2
5	0.101	6897	0.000	0.000	1.00	6.3	0.150	0.100	16.15	3.1	9.2
6	0.101	6897	0.000	0.000	1.00	9.6	0.150	0.100	19.38	3.1	9.2
7	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	22.62	3.1	9.2
13	0.101	6897	0.000	0.000	1.00	10.2	0.150	0.100	42.00	3.1	9.2
Toe						8.0	0.150	0.150			

1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
1.318 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
33.00	8.22	1.00	0.800

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft b/min
98.4	22.2	5.07	5.10	-0.66	4	28	24.09	4	5	9.3 52.4

```
 Front Abutment
05/19/2021
 Terracon Consultants, Inc                                    GRLWEAP
Version 2010

  Depth                  (ft)      37.0  Standard Soil Setup
  Shaft Gain/Loss Factor          1.000  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area              (in2)   113.090  Pile Type
Pipe
  Pile Size            (inch)    12.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0     9.22   29000.    490.0      3.1        0    16558.
16.1
      42.0     9.22   29000.    490.0      3.1        0    16558.
16.1

  Wave Travel Time 2L/c (ms)     5.073

         Pile and Soil Model            Total Capacity Rut
(kips)     111.1
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.101     6897 0.010 0.000 0.85     0.0   0.000 0.100
3.23   3.1     9.2
   2  0.101     6897 0.000 0.000 1.00     0.4   0.150 0.100
6.46   3.1     9.2
   3  0.101     6897 0.000 0.000 1.00     3.5   0.150 0.100
9.69   3.1     9.2
   4  0.101     6897 0.000 0.000 1.00     7.2   0.150 0.100
12.92   3.1     9.2
   5  0.101     6897 0.000 0.000 1.00    10.0   0.150 0.100
16.15   3.1     9.2
   6  0.101     6897 0.000 0.000 1.00    10.2   0.150 0.100
19.38   3.1     9.2
  13  0.101     6897 0.000 0.000 1.00    10.2   0.150 0.100
42.00   3.1     9.2
 Toe                                      8.0   0.150 0.150

      1.318 kips total unreduced pile weight (g= 32.17 ft/s2)
      1.318 kips total reduced pile weight   (g= 32.19 ft/s2)
```

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
37.00	8.22	1.00	0.800

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
111.1	26.5	5.28	5.29	-0.38	3	26	25.63	3	5	9.2	51.4

Front Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
2.0	2.5	0.7	1.8	0.0	0.000	0.000	8.22	0.0
2.0	2.5	0.7	1.8	0.0	0.000	0.000	8.22	0.0
6.0	11.7	6.3	5.3	2.1	7.709	0.000	2.91	12.6
8.5	20.3	12.7	7.6	3.1	11.297	0.000	3.26	12.8
11.0	28.6	20.6	8.0	4.6	14.167	0.000	3.55	11.9
15.0	41.3	33.3	8.0	7.2	17.233	-0.804	3.92	11.0
21.0	60.4	52.3	8.0	11.4	20.061	-0.902	4.41	10.3
27.0	79.4	71.4	8.0	16.4	21.440	-0.984	4.73	9.7
33.0	98.4	90.4	8.0	22.2	24.093	-0.657	5.07	9.3
37.0	111.1	103.1	8.0	26.5	25.635	-0.377	5.28	9.2

Total Driving Time 7 minutes; Total No. of Blows 396
Starting at penetration 2.0 ft

Table of Depths Analyzed with Driving System Modifiers

Depth	Length	Temp. Wait Time	Equivalent Pressure Stroke	Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
2.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
2.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
6.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
8.50	42.00	0.00	8.22	1.00	0.80	1.00	1.00
11.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
15.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
21.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
27.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
33.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00
37.00	42.00	0.00	8.22	1.00	0.80	1.00	1.00

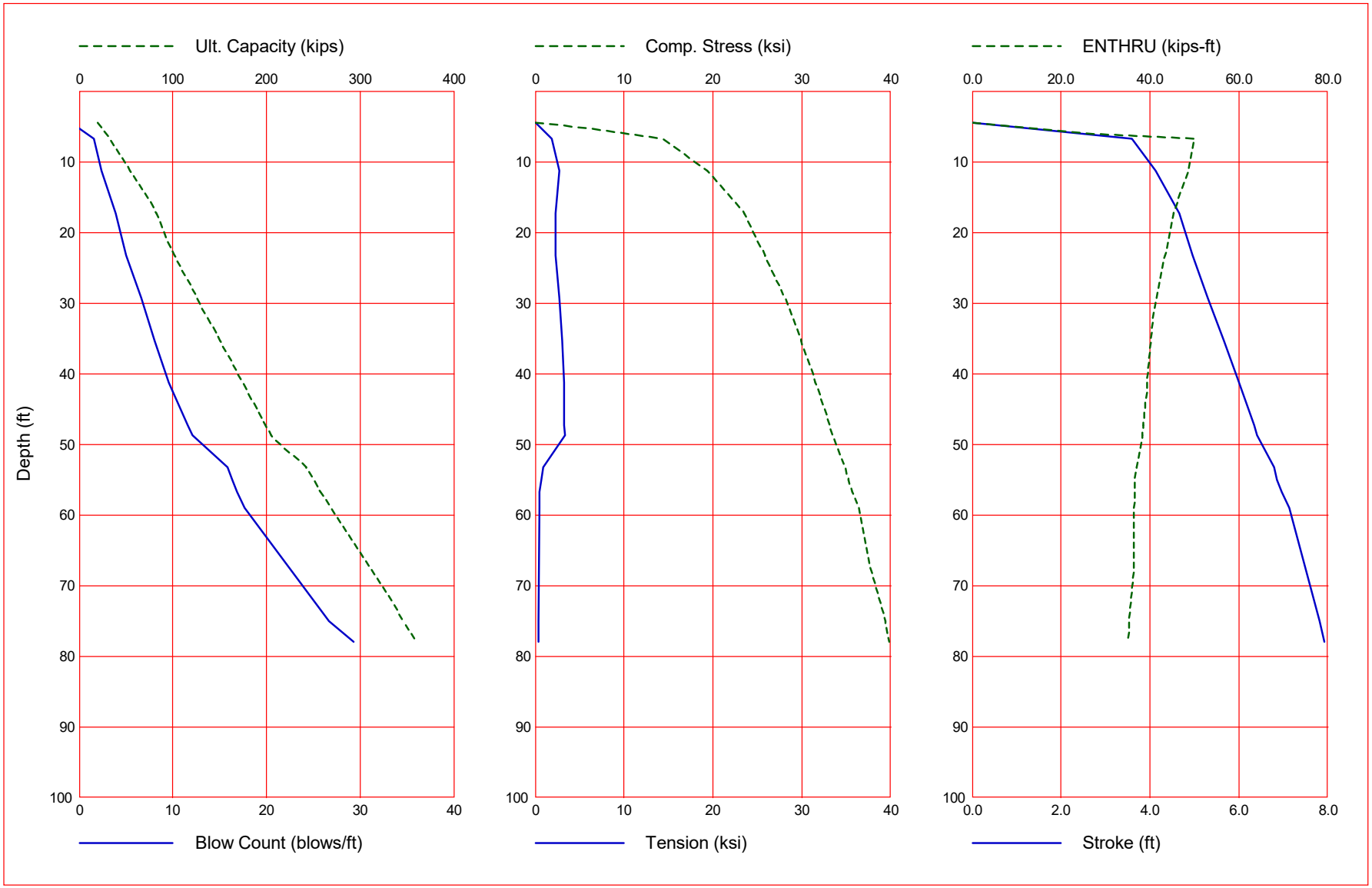
Soil Layer Resistance Values

Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Setup Distance	Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	0.00	0.100	0.150	0.150	0.150	1.000	6.000	168.000
9.00	1.01	8.01	0.100	0.150	0.150	0.150	1.000	6.000	168.000
9.00	1.01	8.01	0.100	0.150	0.150	0.150	1.000	6.000	168.000
42.00	1.01	8.01	0.100	0.150	0.150	0.150	1.000	6.000	168.000

Terracon Consultants, Inc
Pier 1 D 30

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
4.5	19.7	7.4	12.2	-1.0	0.000	0.000	0.00	0.0
6.7	33.2	16.2	17.0	1.6	14.374	-1.817	3.59	50.1
11.3	54.6	37.6	17.0	2.4	19.367	-2.771	4.12	48.8
17.3	82.1	65.1	17.0	3.9	23.526	-2.297	4.66	45.3
23.3	101.5	89.6	12.0	5.0	25.872	-2.240	4.97	43.4
29.3	126.0	114.0	12.0	6.6	28.056	-2.766	5.31	41.5
35.3	150.4	138.4	12.0	8.0	29.926	-3.087	5.66	40.2
41.3	174.8	162.8	12.0	9.6	31.515	-3.241	6.00	39.3
47.3	199.2	187.2	12.0	11.6	33.141	-3.285	6.35	38.6
48.7	204.6	192.7	12.0	12.1	33.391	-3.360	6.42	38.3
53.3	242.2	213.2	29.0	15.8	34.949	-0.860	6.80	37.0
55.0	250.2	221.2	29.0	16.4	35.293	-0.662	6.85	36.6
56.7	258.1	229.2	29.0	16.9	35.655	-0.518	6.97	36.5
59.0	269.2	240.3	29.0	17.7	36.400	-0.474	7.13	36.4
75.0	345.4	316.5	29.0	26.7	39.437	-0.383	7.82	35.3
78.0	359.7	330.8	29.0	29.3	39.834	-0.340	7.92	35.0

Total Continuous Driving Time 19.00 minutes; Total Number of Blows 868 (starting at penetration 4.5 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

```
 Input  File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD
BRIDGE - N6175053\3 - PIER 1\PIER 1.GWW
 Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource
\HAMMER2010.GW
 Hammer File Version:  2003 (12/4/2018)

                        Input File Contents
     Pier 1 D 30
 OUT OSG HAM STR FUL PEL  N SPL N-U P-D %SK ISM  0 PHI RSA ITR H-
D MXT     DEx
-100   0  16   0   1   0  0   0   0   0   0   0  0   0   0   0
0   0   0.000
    Pile g  Hammer g  Toe Area Pile Size           Pile Type
    32.185    32.185   153.930    14.000                Pipe
      W Cp      A Cp      E Cp      T Cp       CoR      ROut
StCp
     1.700   227.000     530.0     2.000     0.800     0.010
0.0
      A Cu      E Cu      T Cu       CoR      ROut      StCu
     0.000       0.0     0.000     0.000     0.000       0.0
      LPle      APle      EPle      WPle      Peri        CI
CoR      ROut
    83.000     21.20   29000.0   490.000     3.665         0
0.850     0.010
  FFatigue        F0  0-Bottom
         0     0.000     0.000
 Manufac  Hmr Name  HmrType No Seg-s
 DELMAG   D 36           1        4
    Ram Wt     Ram L   Ram Dia   MaxStrk   RtdStrk    Efficy
      7.93    106.70     19.61     10.57     10.57      0.80
    IB. Wt     IB. L    IB.Dia    IB CoR     IB RO
      1.95     27.95     19.61     0.900     0.010
  CompStrk A Chamber V Chamber   C Delay  C Duratn Exp Coeff
VolCStart  Vol CEnd
     14.37    304.30    413.60    0.0010    0.0020     1.250
0.00      0.00
     P atm        P1        P2        P3        P4        P5
     14.70   1250.00   1125.00   1010.00    910.00      0.00
    Stroke    Effic.  Pressure  R-Weight   T-Delay Exp-Coeff
Eps-Str  Total-AW
   10.5700    0.8000 1250.0000    0.0000    0.0000    0.0000
0.0100    0.0000
        Qs        Qt        Js        Jt        Qx        Jx
Rati      Dept
     0.100     0.120     0.150     0.150     0.000     0.000
0.000     0.000
  Research Soil Model: Atoe, Plug,  Gap, Q-fac
     0.000     0.000     0.000     0.000
  Research Soil Model: RD-skn: m, d, toe: m, d
     0.000     0.000     0.000     0.000
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
```

```
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt   SU F
LimL    TSf0
    0.00    0.00      0.00    0.00    0.00    0.00    0.00   0.00
6.00   0.000
    6.25    1.25     16.99    0.10    0.14    0.15    0.15   1.50
6.00 168.000
    6.25    1.25     16.99    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   17.50    1.25     16.99    0.10    0.15    0.15    0.15   1.50
6.00 168.000
   17.50    1.11     11.97    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   51.00    1.11     11.97    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   51.00    1.30     28.96    0.10    0.12    0.15    0.15   1.50
6.00 168.000
   78.00    1.30     28.96    0.10    0.12    0.18    0.15   1.50
6.00 168.000
   83.00    1.30     28.96    0.10    0.12    0.18    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
      Dpth          L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      4.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      6.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     11.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     17.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     23.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     29.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     35.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     41.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     47.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     48.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     53.33      0.00      0.00     0.000       0.0     0.000
```

```
0.000     0.000
     55.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     56.67       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     59.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     75.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     78.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
      0.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Pier 1 D 30

Hammer Model: D 36 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	1.982				
2	1.982	328351.3	1.000	0.0000	
3	1.982	328351.3	1.000	0.0000	
4	1.982	328351.3	1.000	0.0000	
Imp Block	1.950	160343.6	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	13.8
Combined Pile Top		15431.7			

HAMMER OPTIONS:
Hammer File ID No. 16 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 7.93 Ram Length (inch) 106.70
Maximum Stroke (ft) 10.57
Rated Stroke (ft) 10.57 Efficiency 0.800

Maximum Pressure (psi) 1250.00 Actual Pressure (psi) 1250.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 19.61
Combustion Delay (s) 0.00100 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

Elastic-Modulus	(ksi)	530.0	Elastic-Modulus	(ksi) 0.0
Thickness	(inch)	2.00	Thickness	(inch) 0.00
Coeff of Restitution		0.8	Coeff of Restitution	1.0
RoundOut	(ft)	0.0	RoundOut	(ft) 0.0
Stiffness	(kips/in)	60155.0	Stiffness	(kips/in) 0.0

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Depth (ft) 4.5 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 19.7

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	Area in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	0.5	0.150	0.100	79.68	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	6.9	0.150	0.100	83.00	3.7	21.2
Toe						12.2	0.150	0.134			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.743
Driveability Analysis

```
  Soil Damping Option            Smith
  Max No Analysis Iterations         0  Time Increment/Critical
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      4.50     10.57      1.00     0.800
```

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
19.7	Hammer did not run										

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Depth (ft) 6.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 33.2

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
23	0.240	15432	0.000	0.000	1.00	0.0	0.150	0.100	76.36	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	4.1	0.150	0.100	79.68	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	12.1	0.150	0.100	83.00	3.7	21.2
Toe						17.0	0.150	0.140			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
6.67	10.57	1.00	0.800

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Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
33.2	1.6	3.59	3.62	-1.82	5	14	14.37	1	4	50.1	62.2

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Depth (ft) 11.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut (kips) 54.6

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
22	0.240	15432	0.000	0.000	1.00	0.7	0.150	0.100	73.04	3.7	21.2
23	0.240	15432	0.000	0.000	1.00	7.4	0.150	0.100	76.36	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	14.3	0.150	0.100	79.68	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	83.00	3.7	21.2
Toe						17.0	0.150	0.145			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

```
11.33     10.57      1.00     0.800
```

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Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
54.6	2.4	4.12	4.08	-2.77	4	14	19.37	3	2	48.8
										58.4

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Depth (ft) 17.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 82.1

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
20	0.240	15432	0.000	0.000	1.00	0.2	0.150	0.100	66.40	3.7	21.2
21	0.240	15432	0.000	0.000	1.00	5.8	0.150	0.100	69.72	3.7	21.2
22	0.240	15432	0.000	0.000	1.00	13.4	0.150	0.100	73.04	3.7	21.2
23	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	76.36	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	83.00	3.7	21.2
Toe						17.0	0.150	0.150			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
17.33	10.57	1.00	0.800

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Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
82.1	3.9	4.66	4.62	-2.30	4	14	23.53	10	4	45.3
										54.9

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Version 2010

Depth (ft) 23.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 101.5

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
18	0.240	15432	0.000	0.000	1.00	0.0	0.150	0.100	59.76	3.7	21.2
19	0.240	15432	0.000	0.000	1.00	4.3	0.150	0.100	63.08	3.7	21.2
20	0.240	15432	0.000	0.000	1.00	12.3	0.150	0.100	66.40	3.7	21.2
21	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	69.72	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	13.9	0.150	0.100	79.68	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	83.00	3.7	21.2
Toe						12.0	0.150	0.140			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
23.33	10.57	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
101.5	5.0	4.97	4.95	-2.24	24	7	25.87	19	5	43.4	52.9

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Depth (ft) 29.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
83.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 126.0

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop	Perim	Area						
	kips	k/in	ft	ft		kips	s/ft	inch
ft	ft	in2						
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100
3.32	3.7	21.2						
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100
6.64	3.7	21.2						
17	0.240	15432	0.000	0.000	1.00	2.8	0.150	0.100
56.44	3.7	21.2						
18	0.240	15432	0.000	0.000	1.00	10.8	0.150	0.100
59.76	3.7	21.2						
19	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100
63.08	3.7	21.2						
20	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100
66.40	3.7	21.2						
22	0.240	15432	0.000	0.000	1.00	14.3	0.150	0.100
73.04	3.7	21.2						
23	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
76.36	3.7	21.2						
25	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
83.00	3.7	21.2						
Toe						12.0	0.150	0.140

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
29.33	10.57	1.00	0.800

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Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
126.0	6.6	5.31	5.35	-2.77	24	7	28.06	18	5	41.5	51.0

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Version 2010

Depth (ft) 35.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
83.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 150.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
15	0.240	15432	0.000	0.000	1.00	1.7	0.150	0.100	49.80	3.7	21.2
16	0.240	15432	0.000	0.000	1.00	9.2	0.150	0.100	53.12	3.7	21.2
17	0.240	15432	0.000	0.000	1.00	15.0	0.150	0.100	56.44	3.7	21.2
18	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	59.76	3.7	21.2
20	0.240	15432	0.000	0.000	1.00	14.6	0.150	0.100	66.40	3.7	21.2
21	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	69.72	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	83.00	3.7	21.2
Toe						12.0	0.150	0.140			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
35.33	10.57	1.00	0.800

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Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
150.4	8.0	5.66	5.68	-3.09	24	7	29.93	16	5	40.2	49.4

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Depth (ft) 41.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
83.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 174.8

No. Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop Perim	Area						
kips	k/in	ft	ft		kips	s/ft	inch
ft ft	in2						
1 0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100
3.32 3.7	21.2						
2 0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100
6.64 3.7	21.2						
13 0.240	15432	0.000	0.000	1.00	0.8	0.150	0.100
43.16 3.7	21.2						
14 0.240	15432	0.000	0.000	1.00	7.7	0.150	0.100
46.48 3.7	21.2						
15 0.240	15432	0.000	0.000	1.00	14.4	0.150	0.100
49.80 3.7	21.2						
16 0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100
53.12 3.7	21.2						
18 0.240	15432	0.000	0.000	1.00	14.9	0.150	0.100
59.76 3.7	21.2						
19 0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
63.08 3.7	21.2						
25 0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
83.00 3.7	21.2						
Toe					12.0	0.150	0.140

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
41.33	10.57	1.00	0.800

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Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
174.8	9.6	6.00	6.00	-3.24	24	7	31.52	14	4	39.3	48.0

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Version 2010

Depth (ft) 47.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
83.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 199.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop	Perim	Area						
	kips	k/in	ft	ft		kips	s/ft	inch
ft	ft	in2						
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100
3.32	3.7	21.2						
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100
6.64	3.7	21.2						
11	0.240	15432	0.000	0.000	1.00	0.3	0.150	0.100
36.52	3.7	21.2						
12	0.240	15432	0.000	0.000	1.00	6.1	0.150	0.100
39.84	3.7	21.2						
13	0.240	15432	0.000	0.000	1.00	13.6	0.150	0.100
43.16	3.7	21.2						
14	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100
46.48	3.7	21.2						
17	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
56.44	3.7	21.2						
18	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
59.76	3.7	21.2						
25	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
83.00	3.7	21.2						
Toe						12.0	0.150	0.140

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
47.33	10.57	1.00	0.800

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Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
199.2	11.6	6.35	6.31	-3.29	24	7	33.14	12	4	38.6	46.8

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Depth (ft) 48.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
83.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 204.6

No. Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop Perim	Area						
kips	k/in	ft	ft		kips	s/ft	inch
ft ft	in2						
1 0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100
3.32 3.7	21.2						
2 0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100
6.64 3.7	21.2						
11 0.240	15432	0.000	0.000	1.00	1.8	0.150	0.100
36.52 3.7	21.2						
12 0.240	15432	0.000	0.000	1.00	9.4	0.150	0.100
39.84 3.7	21.2						
13 0.240	15432	0.000	0.000	1.00	15.0	0.150	0.100
43.16 3.7	21.2						
14 0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100
46.48 3.7	21.2						
16 0.240	15432	0.000	0.000	1.00	14.5	0.150	0.100
53.12 3.7	21.2						
17 0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
56.44 3.7	21.2						
25 0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100
83.00 3.7	21.2						
Toe					12.0	0.150	0.140

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
48.67	10.57	1.00	0.800

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Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
204.6	12.1	6.42	6.39	-3.36	24	7	33.39	12	4	38.3	46.5

Pier 1 D 30
05/19/2021
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Version 2010

Depth (ft) 53.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
83.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 242.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
9	0.240	15432	0.000	0.000	1.00	0.0	0.150	0.100	29.88	3.7	21.2
10	0.240	15432	0.000	0.000	1.00	4.6	0.150	0.100	33.20	3.7	21.2
11	0.240	15432	0.000	0.000	1.00	12.5	0.150	0.100	36.52	3.7	21.2
12	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	39.84	3.7	21.2
15	0.240	15432	0.000	0.000	1.00	13.9	0.150	0.100	49.80	3.7	21.2
16	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	53.12	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	15.1	0.151	0.100	83.00	3.7	21.2
Toe						29.0	0.150	0.120			

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
53.33	10.57	1.00	0.800

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Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft b/min
242.2	15.8	6.80	6.81	-0.86	24	7	34.95	11	4	37.0 45.2

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Version 2010

Depth (ft) 55.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
83.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 250.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7
9	0.240	15432	0.000	0.000	1.00	1.3	0.150	0.100	29.88	3.7
10	0.240	15432	0.000	0.000	1.00	8.6	0.150	0.100	33.20	3.7
11	0.240	15432	0.000	0.000	1.00	14.8	0.150	0.100	36.52	3.7
12	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	39.84	3.7
14	0.240	15432	0.000	0.000	1.00	14.7	0.150	0.100	46.48	3.7
15	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	49.80	3.7
24	0.240	15432	0.000	0.000	1.00	14.0	0.150	0.100	79.68	3.7
25	0.240	15432	0.000	0.000	1.00	15.8	0.153	0.100	83.00	3.7

Area
in2
21.2
21.2
21.2
21.2
21.2
21.2
21.2
21.2
21.2
21.2

Toe 29.0 0.150 0.120

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
55.00	10.57	1.00	0.800

Pier 1 D 30
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Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
250.2	16.4	6.85	6.89	-0.66	24	7	35.29	10	4	36.6	44.9

Pier 1 D 30
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 56.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
83.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 258.1

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
8	0.240	15432	0.000	0.000	1.00	0.0	0.150	0.100	26.56	3.7	21.2
9	0.240	15432	0.000	0.000	1.00	4.6	0.150	0.100	29.88	3.7	21.2
10	0.240	15432	0.000	0.000	1.00	12.5	0.150	0.100	33.20	3.7	21.2
11	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	36.52	3.7	21.2
14	0.240	15432	0.000	0.000	1.00	13.9	0.150	0.100	46.48	3.7	21.2
15	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	49.80	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	15.1	0.151	0.100	79.68	3.7	21.2
25	0.240	15432	0.000	0.000	1.00	15.8	0.154	0.100	83.00	3.7	21.2

Toe 29.0 0.150 0.120

5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
5.990 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
56.67	10.57	1.00	0.800

Pier 1 D 30
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Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
258.1	16.9	6.97	6.98	-0.52	24	7	35.66	9	3	36.5	44.6

Pier 1 D 30
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 59.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
83.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 269.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
8	0.240	15432	0.000	0.000	1.00	2.4	0.150	0.100	26.56	3.7	21.2
9	0.240	15432	0.000	0.000	1.00	10.3	0.150	0.100	29.88	3.7	21.2
10	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	33.20	3.7	21.2
11	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	36.52	3.7	21.2
13	0.240	15432	0.000	0.000	1.00	14.4	0.150	0.100	43.16	3.7	21.2
14	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	46.48	3.7	21.2
23	0.240	15432	0.000	0.000	1.00	14.5	0.150	0.100	76.36	3.7	21.2
24	0.240	15432	0.000	0.000	1.00	15.8	0.153	0.100	79.68	3.7	21.2

```
  25  0.240    15432 0.000 0.000 1.00    15.8   0.157 0.100
83.00   3.7    21.2
 Toe                                     29.0   0.150 0.120

      5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.990 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     59.00     10.57      1.00     0.800
```

Pier 1 D 30
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Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
269.2	17.7	7.13	7.10	-0.47	24	7	36.40	9	3	36.4	44.2

Pier 1 D 30
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 75.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
83.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 345.4

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	21.2
3	0.240	15432	0.000	0.000	1.00	1.4	0.150	0.100	9.96	3.7	21.2
4	0.240	15432	0.000	0.000	1.00	8.8	0.150	0.100	13.28	3.7	21.2
5	0.240	15432	0.000	0.000	1.00	14.9	0.150	0.100	16.60	3.7	21.2
6	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	19.92	3.7	21.2
8	0.240	15432	0.000	0.000	1.00	14.7	0.150	0.100	26.56	3.7	21.2
9	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	29.88	3.7	21.2
18	0.240	15432	0.000	0.000	1.00	14.0	0.150	0.100	59.76	3.7	21.2
19	0.240	15432	0.000	0.000	1.00	15.8	0.153	0.100	63.08	3.7	21.2

```
  20  0.240    15432 0.000 0.000 1.00    15.8   0.156 0.100
66.40   3.7    21.2
  21  0.240    15432 0.000 0.000 1.00    15.8   0.160 0.100
69.72   3.7    21.2
  22  0.240    15432 0.000 0.000 1.00    15.8   0.164 0.100
73.04   3.7    21.2
  23  0.240    15432 0.000 0.000 1.00    15.8   0.167 0.100
76.36   3.7    21.2
  24  0.240    15432 0.000 0.000 1.00    15.8   0.171 0.100
79.68   3.7    21.2
  25  0.240    15432 0.000 0.000 1.00    15.8   0.175 0.100
83.00   3.7    21.2
 Toe                                     29.0   0.150 0.120

      5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.990 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     75.00     10.57      1.00     0.800
```

Pier 1 D 30
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl Rt b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	kip-ft	b/min
345.4	26.7	7.82	7.80	-0.38	24	7	39.44	4	2	35.3	42.2

Pier 1 D 30
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Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 78.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
83.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 10.025

Pile and Soil Model Total Capacity Rut
(kips) 359.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15432	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	21.2
2	0.240	15432	0.000	0.000	1.00	1.0	0.150	0.100	6.64	3.7	21.2
3	0.240	15432	0.000	0.000	1.00	8.0	0.150	0.100	9.96	3.7	21.2
4	0.240	15432	0.000	0.000	1.00	14.6	0.150	0.100	13.28	3.7	21.2
5	0.240	15432	0.000	0.000	1.00	15.2	0.150	0.100	16.60	3.7	21.2
7	0.240	15432	0.000	0.000	1.00	14.8	0.150	0.100	23.24	3.7	21.2
8	0.240	15432	0.000	0.000	1.00	13.5	0.150	0.100	26.56	3.7	21.2
17	0.240	15432	0.000	0.000	1.00	13.8	0.150	0.100	56.44	3.7	21.2
18	0.240	15432	0.000	0.000	1.00	15.8	0.152	0.100	59.76	3.7	21.2
19	0.240	15432	0.000	0.000	1.00	15.8	0.156	0.100	63.08	3.7	21.2

```
  20  0.240    15432 0.000 0.000 1.00    15.8   0.160 0.100
66.40   3.7    21.2
  21  0.240    15432 0.000 0.000 1.00    15.8   0.163 0.100
69.72   3.7    21.2
  22  0.240    15432 0.000 0.000 1.00    15.8   0.167 0.100
73.04   3.7    21.2
  23  0.240    15432 0.000 0.000 1.00    15.8   0.171 0.100
76.36   3.7    21.2
  24  0.240    15432 0.000 0.000 1.00    15.8   0.174 0.100
79.68   3.7    21.2
  25  0.240    15432 0.000 0.000 1.00    15.8   0.178 0.100
83.00   3.7    21.2
 Toe                                     29.0   0.150 0.120

      5.988 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.990 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     78.00     10.57      1.00     0.800
```

Pier 1 D 30
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Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft b/min
359.7	29.3	7.92	7.91	-0.34	24	7	39.83	3	2	35.0 42.0

Pier 1 D 30
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
4.5	19.7	7.4	12.2	Hammer did not run				
6.7	33.2	16.2	17.0	1.6	14.374	-1.817	3.59	50.1
11.3	54.6	37.6	17.0	2.4	19.367	-2.771	4.12	48.8
17.3	82.1	65.1	17.0	3.9	23.526	-2.297	4.66	45.3
23.3	101.5	89.6	12.0	5.0	25.872	-2.240	4.97	43.4
29.3	126.0	114.0	12.0	6.6	28.056	-2.766	5.31	41.5
35.3	150.4	138.4	12.0	8.0	29.926	-3.087	5.66	40.2
41.3	174.8	162.8	12.0	9.6	31.515	-3.241	6.00	39.3
47.3	199.2	187.2	12.0	11.6	33.141	-3.285	6.35	38.6
48.7	204.6	192.7	12.0	12.1	33.391	-3.360	6.42	38.3
53.3	242.2	213.2	29.0	15.8	34.949	-0.860	6.80	37.0
55.0	250.2	221.2	29.0	16.4	35.293	-0.662	6.85	36.6
56.7	258.1	229.2	29.0	16.9	35.655	-0.518	6.97	36.5
59.0	269.2	240.3	29.0	17.7	36.400	-0.474	7.13	36.4
75.0	345.4	316.5	29.0	26.7	39.437	-0.383	7.82	35.3
78.0	359.7	330.8	29.0	29.3	39.834	-0.340	7.92	35.0

Total Driving Time 19 minutes; Total No. of Blows 868
Starting at penetration 4.5 ft

Table of Depths Analyzed with Driving System Modifiers

Depth	Length	Temp. Wait Time	Equivalent Pressure Stroke	Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
4.50	83.00	0.00	10.57	1.00	0.80	1.00	1.00
6.67	83.00	0.00	10.57	1.00	0.80	1.00	1.00
11.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
17.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
23.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
29.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
35.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
41.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
47.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
48.67	83.00	0.00	10.57	1.00	0.80	1.00	1.00
53.33	83.00	0.00	10.57	1.00	0.80	1.00	1.00
55.00	83.00	0.00	10.57	1.00	0.80	1.00	1.00
56.67	83.00	0.00	10.57	1.00	0.80	1.00	1.00
59.00	83.00	0.00	10.57	1.00	0.80	1.00	1.00
75.00	83.00	0.00	10.57	1.00	0.80	1.00	1.00
78.00	83.00	0.00	10.57	1.00	0.80	1.00	1.00

Soil Layer Resistance Values

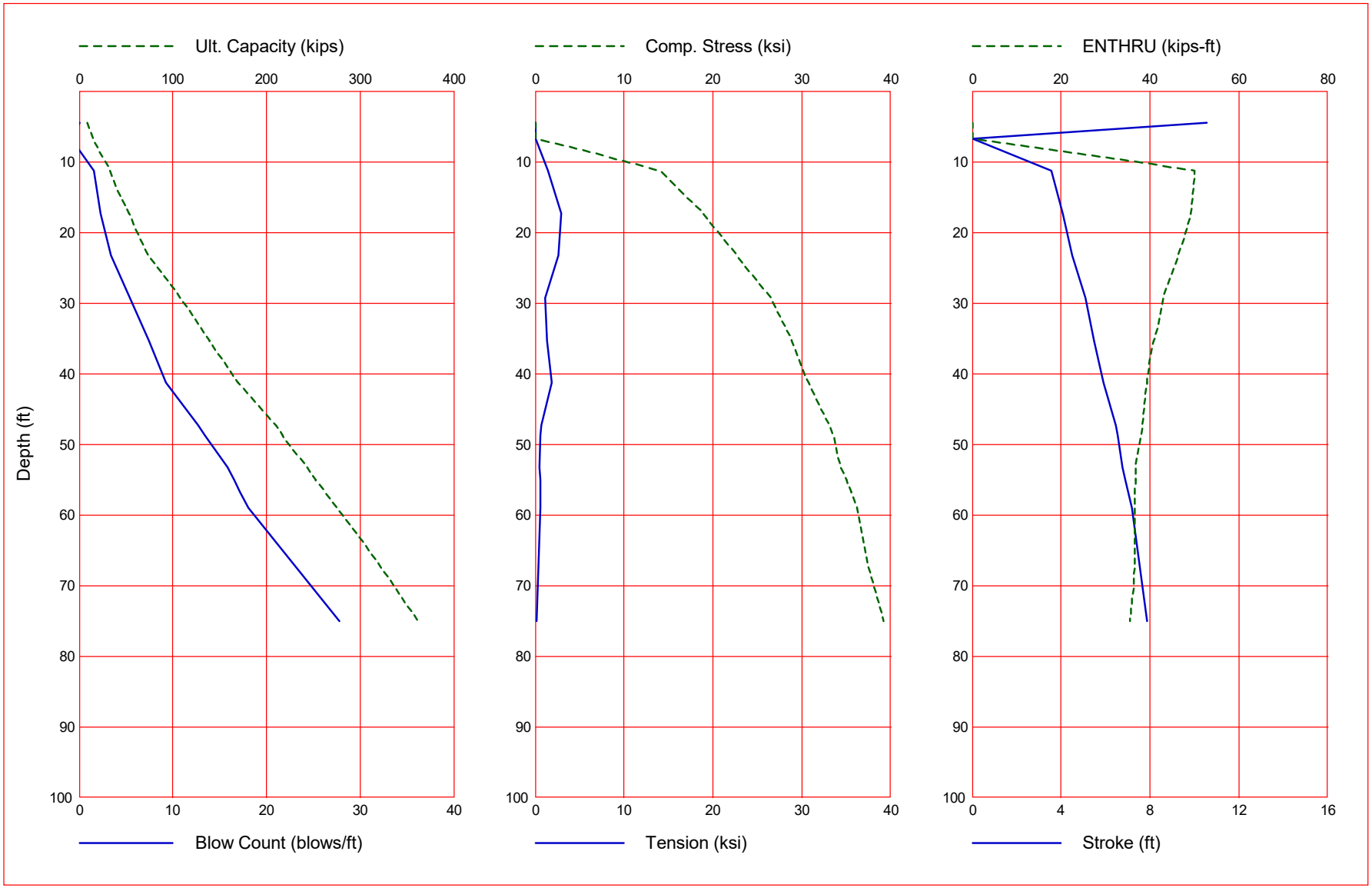
Shaft	End	Shaft	Toe	Shaft	Toe	Soil Limit	Setup

Depth	Res.	Bearing	Quake	Quake	Damping	Damping	Setup	Distance	Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	0.00	0.100	0.120	0.150	0.150	0.000	6.000	0.000
6.25	1.25	16.99	0.100	0.140	0.150	0.150	1.000	6.000	168.000
6.25	1.25	16.99	0.100	0.140	0.150	0.150	1.000	6.000	168.000
17.50	1.25	16.99	0.100	0.150	0.150	0.150	1.000	6.000	168.000
17.50	1.11	11.97	0.100	0.140	0.150	0.150	1.000	6.000	168.000
51.00	1.11	11.97	0.100	0.140	0.150	0.150	1.000	6.000	168.000
51.00	1.30	28.96	0.100	0.120	0.150	0.150	1.000	6.000	168.000
78.00	1.30	28.96	0.100	0.120	0.180	0.150	1.000	6.000	168.000
83.00	1.30	28.96	0.100	0.120	0.180	0.150	1.000	6.000	168.000

Terracon Consultants, Inc
Pier 2

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
4.5	8.4	3.5	5.0	0.0	0.000	0.000	10.57	0.0
6.7	14.9	7.6	7.3	-1.0	0.000	0.000	0.00	0.0
11.3	32.6	21.6	11.0	1.6	14.038	-1.399	3.55	50.0
17.3	53.1	42.1	11.0	2.3	18.959	-2.939	4.06	49.1
23.3	73.6	62.6	11.0	3.4	22.646	-2.568	4.49	46.3
29.3	108.3	92.2	16.0	5.4	26.459	-1.074	5.08	42.9
35.3	139.1	123.0	16.0	7.4	28.844	-1.386	5.50	40.9
41.3	169.9	153.8	16.0	9.3	30.774	-1.849	5.92	39.4
47.3	210.2	186.1	24.0	12.7	33.076	-0.740	6.45	38.3
48.7	217.7	193.6	24.0	13.4	33.527	-0.603	6.53	38.1
53.3	243.7	219.7	24.0	15.8	34.404	-0.514	6.75	36.8
55.0	253.0	229.0	24.0	16.6	35.022	-0.564	6.89	36.7
56.7	262.4	238.3	24.0	17.2	35.551	-0.603	7.02	36.6
59.0	275.4	251.4	24.0	18.1	36.227	-0.626	7.20	36.6
75.0	361.6	327.6	34.0	27.8	39.237	-0.131	7.89	35.5

Total Continuous Driving Time 17.00 minutes; Total Number of Blows 761 (starting at penetration 4.5 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

```
 Input  File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD
BRIDGE - N6175053\4 - PIER 2\PIER 2.GWW
 Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource
\HAMMER2010.GW
 Hammer File Version:  2003 (12/4/2018)

                        Input File Contents
     Pier 2
 OUT OSG HAM STR FUL PEL  N SPL N-U P-D %SK ISM  0 PHI RSA ITR H-
D MXT     DEx
-100   0  16   0   1   0  0   0   0   0   0   0  0   0   0   0
0   0   0.000
    Pile g  Hammer g  Toe Area Pile Size           Pile Type
    32.185    32.185   153.930    14.000                Pipe
      W Cp      A Cp      E Cp      T Cp       CoR      ROut
StCp
     1.700   227.000     530.0     2.000     0.800     0.010
0.0
      A Cu      E Cu      T Cu       CoR      ROut      StCu
     0.000       0.0     0.000     0.000     0.000       0.0
      LPle      APle      EPle      WPle      Peri        CI
CoR      ROut
    80.000     21.20   29000.0   490.000     3.665         0
0.850     0.010
  FFatigue        F0  0-Bottom
         0     0.000     0.000
 Manufac  Hmr Name  HmrType No Seg-s
 DELMAG   D 36            1        4
    Ram Wt     Ram L   Ram Dia   MaxStrk   RtdStrk    Efficy
      7.93    106.70     19.61     10.57     10.57      0.80
    IB. Wt     IB. L    IB.Dia    IB CoR     IB RO
      1.95     27.95     19.61     0.900     0.010
  CompStrk A Chamber V Chamber   C Delay  C Duratn Exp Coeff
VolCStart  Vol CEnd
     14.37    304.30    413.60    0.0010    0.0020     1.250
0.00      0.00
     P atm        P1        P2        P3        P4        P5
     14.70   1250.00   1125.00   1010.00    910.00      0.00
    Stroke    Effic.  Pressure  R-Weight   T-Delay Exp-Coeff
Eps-Str  Total-AW
   10.5700    0.8000 1250.0000    0.0000    0.0000    0.0000
0.0100    0.0000
        Qs        Qt        Js        Jt        Qx        Jx
Rati      Dept
     0.100     0.110     0.150     0.150     0.000     0.000
0.000     0.000
  Research Soil Model: Atoe, Plug,  Gap, Q-fac
     0.000     0.000     0.000     0.000
  Research Soil Model: RD-skn: m, d, toe: m, d
     0.000     0.000     0.000     0.000
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
```

```
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt   SU F
LimL    TSf0
    0.00    0.00      0.00    0.00    0.00    0.00    0.00   0.00
6.00   0.000
   10.00    0.93     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
   10.00    0.93     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
   24.00    0.93     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
   24.00    1.40     16.03    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   44.00    1.40     16.03    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   44.00    1.52     24.04    0.10    0.12    0.15    0.15   1.50
6.00 168.000
   59.00    1.52     24.04    0.10    0.12    0.15    0.15   1.50
6.00 168.000
   59.00    1.30     33.98    0.10    0.11    0.15    0.15   1.50
6.00 168.000
   78.00    1.30     33.98    0.10    0.11    0.15    0.15   1.50
6.00 168.000
   80.00    1.30     33.98    0.10    0.11    0.15    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
     Dpth         L      Wait      Strk      Pmx%      Eff.
Stff       CoR
     4.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     6.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    11.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    17.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    23.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    29.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    35.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    41.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
    47.33      0.00      0.00     0.000       0.0     0.000
```

```
0.000     0.000
     48.67       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     53.33       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     55.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     56.67       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     59.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
     75.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
      0.00       0.00       0.00      0.000        0.0      0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Pier 2

Hammer Model: D 36 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	1.982				
2	1.982	328351.3	1.000	0.0000	
3	1.982	328351.3	1.000	0.0000	
4	1.982	328351.3	1.000	0.0000	
Imp Block	1.950	160343.6	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	13.8
Combined Pile Top		15370.0			

HAMMER OPTIONS:
Hammer File ID No. 16 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 7.93 Ram Length (inch) 106.70
Maximum Stroke (ft) 10.57
Rated Stroke (ft) 10.57 Efficiency 0.800

Maximum Pressure (psi) 1250.00 Actual Pressure (psi) 1250.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 19.61
Combustion Delay (s) 0.00100 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

Elastic-Modulus	(ksi)	530.0	Elastic-Modulus	(ksi) 0.0
Thickness	(inch)	2.00	Thickness	(inch) 0.00
Coeff of Restitution		0.8	Coeff of Restitution	1.0
RoundOut	(ft)	0.0	RoundOut	(ft) 0.0
Stiffness	(kips/in)	60155.0	Stiffness	(kips/in) 0.0

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 4.5 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp	EA/c
ft	in2	ksi	lb/ft3	ft		ft/s	k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
80.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 8.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	0.2	0.150	0.100	76.67	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	3.2	0.150	0.100	80.00	3.7	21.2
Toe						5.0	0.150	0.137			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.743
Driveability Analysis

```
  Soil Damping Option            Smith
  Max No Analysis Iterations         0  Time Increment/Critical
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      4.50     10.57      1.00     0.800


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)      9.4      8.4
  Hammer+Pile Weight > Rult: Pile Runs
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
8.4	0.0	10.57	0.00	0.00	1	0	0.00	1	0	0.0	78.6

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 6.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
80.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 14.9

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
22	0.240	15370	0.000	0.000	1.00	0.0	0.150	0.100	73.33	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	1.9	0.150	0.100	76.67	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	5.7	0.150	0.100	80.00	3.7	21.2
Toe						7.3	0.150	0.150			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
6.67	10.57	1.00	0.800

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
14.9	Hammer did not run										

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 11.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
80.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut (kips) 32.6

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	0.3	0.150	0.100	70.00	3.7	21.2
22	0.240	15370	0.000	0.000	1.00	3.4	0.150	0.100	73.33	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	7.2	0.150	0.100	76.67	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	10.7	0.150	0.100	80.00	3.7	21.2
Toe						11.0	0.150	0.170			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

```
11.33     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
32.6	1.6	3.55	3.57	-1.40	5	14	14.04	1	4	50.0
										62.5

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 17.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 53.1

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
19	0.240	15370	0.000	0.000	1.00	0.1	0.150	0.100	63.33	3.7	21.2
20	0.240	15370	0.000	0.000	1.00	2.7	0.150	0.100	66.67	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	6.4	0.150	0.100	70.00	3.7	21.2
22	0.240	15370	0.000	0.000	1.00	10.2	0.150	0.100	73.33	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	76.67	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	80.00	3.7	21.2
Toe						11.0	0.150	0.170			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
17.33	10.57	1.00	0.800

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
53.1	2.3	4.06	4.03	-2.94	4	13	18.96	2	2	49.1	58.8

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 23.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.	37.1
80.0	21.20	29000.	490.0	3.7	0	16558.	37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 73.6

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
18	0.240	15370	0.000	0.000	1.00	1.9	0.150	0.100	60.00	3.7	21.2
19	0.240	15370	0.000	0.000	1.00	5.7	0.150	0.100	63.33	3.7	21.2
20	0.240	15370	0.000	0.000	1.00	9.5	0.150	0.100	66.67	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	70.00	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	80.00	3.7	21.2
Toe						11.0	0.150	0.170			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
23.33	10.57	1.00	0.800

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
73.6	3.4	4.49	4.45	-2.57	4	13	22.65	6	3	46.3
										55.9

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 29.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 108.3

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	1.2	0.150	0.100	53.33	3.7	21.2
17	0.240	15370	0.000	0.000	1.00	4.9	0.150	0.100	56.67	3.7	21.2
18	0.240	15370	0.000	0.000	1.00	8.7	0.150	0.100	60.00	3.7	21.2
19	0.240	15370	0.000	0.000	1.00	11.3	0.150	0.100	63.33	3.7	21.2
20	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	66.67	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	14.8	0.150	0.100	76.67	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	80.00	3.7	21.2
Toe						16.0	0.150	0.140			

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
29.33	10.57	1.00	0.800

Pier 2
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Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
108.3	5.4	5.08	5.06	-1.07	23	7	26.46	17	5	42.9

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 35.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	21.20	29000.	490.0	3.7	0	16558.
80.0	21.20	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
37.1
37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 139.1

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
14	0.240	15370	0.000	0.000	1.00	0.7	0.150	0.100	46.67	3.7	21.2
15	0.240	15370	0.000	0.000	1.00	4.2	0.150	0.100	50.00	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	8.0	0.150	0.100	53.33	3.7	21.2
17	0.240	15370	0.000	0.000	1.00	11.1	0.150	0.100	56.67	3.7	21.2
18	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	60.00	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	13.7	0.150	0.100	70.00	3.7	21.2
22	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	73.33	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	80.00	3.7	21.2

Toe 16.0 0.150 0.140

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
35.33	10.57	1.00	0.800

Pier 2
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Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
139.1	7.4	5.50	5.53	-1.39	23	7	28.84	15	5	40.9
kip-ft										50.1

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 41.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558. 37.1
80.0	21.20	29000.	490.0	3.7	0	16558. 37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 169.9

No. Weight LbTop	Stiffn Perim	C-Slk Area	T-Slk	CoR	Soil-S	Soil-D	Quake
kips	k/in	ft	ft		kips	s/ft	inch
ft	ft	in2					
1 0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100
3.33	3.7	21.2					
2 0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100
6.67	3.7	21.2					
12 0.240	15370	0.000	0.000	1.00	0.3	0.150	0.100
40.00	3.7	21.2					
13 0.240	15370	0.000	0.000	1.00	3.4	0.150	0.100
43.33	3.7	21.2					
14 0.240	15370	0.000	0.000	1.00	7.2	0.150	0.100
46.67	3.7	21.2					
15 0.240	15370	0.000	0.000	1.00	10.7	0.150	0.100
50.00	3.7	21.2					
16 0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100
53.33	3.7	21.2					
19 0.240	15370	0.000	0.000	1.00	12.5	0.150	0.100
63.33	3.7	21.2					
20 0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100
66.67	3.7	21.2					
24 0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100
80.00	3.7	21.2					

Toe 16.0 0.150 0.140

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
41.33	10.57	1.00	0.800

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
169.9	9.3	5.92	5.94	-1.85	23	7	30.77	13	4	39.4	48.3

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 47.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 210.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	0.1	0.150	0.100	33.33	3.7	21.2
11	0.240	15370	0.000	0.000	1.00	2.7	0.150	0.100	36.67	3.7	21.2
12	0.240	15370	0.000	0.000	1.00	6.4	0.150	0.100	40.00	3.7	21.2
13	0.240	15370	0.000	0.000	1.00	10.2	0.150	0.100	43.33	3.7	21.2
14	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	46.67	3.7	21.2
18	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	60.00	3.7	21.2
19	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	63.33	3.7	21.2
24	0.240	15370	0.000	0.000	1.00	18.6	0.150	0.100	80.00	3.7	21.2

Toe 24.0 0.150 0.120

5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
5.774 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
47.33	10.57	1.00	0.800

Pier 2
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Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
210.2	12.7	6.45	6.43	-0.74	11	41	33.08	11	4	46.4

Pier 2
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Version 2010

Depth (ft) 48.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	21.20	29000.	490.0	3.7	0	16558. 37.1
80.0	21.20	29000.	490.0	3.7	0	16558. 37.1

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 217.7

No.	Weight LbTop	Stiffn Perim	C-Slk Area	T-Slk	CoR	Soil-S	Soil-D	Quake
	kips	k/in	ft	ft		kips	s/ft	inch
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100
3.33	3.7	21.2						
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100
6.67	3.7	21.2						
10	0.240	15370	0.000	0.000	1.00	0.7	0.150	0.100
33.33	3.7	21.2						
11	0.240	15370	0.000	0.000	1.00	4.2	0.150	0.100
36.67	3.7	21.2						
12	0.240	15370	0.000	0.000	1.00	8.0	0.150	0.100
40.00	3.7	21.2						
13	0.240	15370	0.000	0.000	1.00	11.1	0.150	0.100
43.33	3.7	21.2						
14	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100
46.67	3.7	21.2						
17	0.240	15370	0.000	0.000	1.00	13.7	0.150	0.100
56.67	3.7	21.2						
18	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100
60.00	3.7	21.2						
23	0.240	15370	0.000	0.000	1.00	17.7	0.150	0.100
76.67	3.7	21.2						

```
  24  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
80.00   3.7    21.2
 Toe                                     24.0   0.150 0.120

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     48.67     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct Bl/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Rt kip-ft	b/min
217.7	13.4	6.53	6.51	-0.60	10	39	33.53	11	4	38.1	46.1

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 53.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 243.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
9	0.240	15370	0.000	0.000	1.00	1.9	0.150	0.100	30.00	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	5.7	0.150	0.100	33.33	3.7	21.2
11	0.240	15370	0.000	0.000	1.00	9.5	0.150	0.100	36.67	3.7	21.2
12	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	40.00	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	16.0	0.150	0.100	53.33	3.7	21.2
17	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	56.67	3.7	21.2
22	0.240	15370	0.000	0.000	1.00	18.3	0.150	0.100	73.33	3.7	21.2
23	0.240	15370	0.000	0.000	1.00	18.6	0.150	0.100	76.67	3.7	21.2

```
  24  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
80.00   3.7    21.2
 Toe                                     24.0   0.150 0.120

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     53.33     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
243.7	15.8	6.75	6.81	-0.51	23	7	34.40	10	4	36.8
kip-ft										45.3

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 55.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 253.0

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
8	0.240	15370	0.000	0.000	1.00	0.5	0.150	0.100	26.67	3.7	21.2
9	0.240	15370	0.000	0.000	1.00	3.8	0.150	0.100	30.00	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	7.6	0.150	0.100	33.33	3.7	21.2
11	0.240	15370	0.000	0.000	1.00	10.9	0.150	0.100	36.67	3.7	21.2
12	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	40.00	3.7	21.2
15	0.240	15370	0.000	0.000	1.00	13.1	0.150	0.100	50.00	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	53.33	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	17.6	0.150	0.100	70.00	3.7	21.2

```
  22  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
73.33   3.7    21.2
  24  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
80.00   3.7    21.2
 Toe                                     24.0   0.150 0.120

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     55.00     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
253.0	16.6	6.89	6.91	-0.56	23	7	35.02	9	3	44.8
										36.7

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 56.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 262.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
7	0.240	15370	0.000	0.000	1.00	0.0	0.150	0.100	23.33	3.7	21.2
8	0.240	15370	0.000	0.000	1.00	1.9	0.150	0.100	26.67	3.7	21.2
9	0.240	15370	0.000	0.000	1.00	5.7	0.150	0.100	30.00	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	9.5	0.150	0.100	33.33	3.7	21.2
11	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	36.67	3.7	21.2
15	0.240	15370	0.000	0.000	1.00	16.0	0.150	0.100	50.00	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	53.33	3.7	21.2
21	0.240	15370	0.000	0.000	1.00	18.3	0.150	0.100	70.00	3.7	21.2

```
  22  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
73.33   3.7    21.2
  24  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
80.00   3.7    21.2
 Toe                                     24.0   0.150 0.120

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     56.67     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
262.4	17.2	7.02	7.01	-0.60	23	7	35.55	9	3	36.6
										44.5

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 59.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 275.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.0	0.000	0.100	6.67	3.7	21.2
7	0.240	15370	0.000	0.000	1.00	0.9	0.150	0.100	23.33	3.7	21.2
8	0.240	15370	0.000	0.000	1.00	4.6	0.150	0.100	26.67	3.7	21.2
9	0.240	15370	0.000	0.000	1.00	8.3	0.150	0.100	30.00	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	11.2	0.150	0.100	33.33	3.7	21.2
11	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	36.67	3.7	21.2
14	0.240	15370	0.000	0.000	1.00	14.2	0.150	0.100	46.67	3.7	21.2
15	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	50.00	3.7	21.2
20	0.240	15370	0.000	0.000	1.00	17.9	0.150	0.100	66.67	3.7	21.2

```
  21  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
70.00   3.7    21.2
  24  0.240    15370 0.000 0.000 1.00    18.6   0.150 0.100
80.00   3.7    21.2
 Toe                                     24.0   0.150 0.120

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     59.00     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
275.4	18.1	7.20	7.14	-0.63	23	7	36.23	8	3	36.6
kip-ft										44.0

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 75.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	21.20	29000.	490.0	3.7	0	16558.
37.1						
80.0	21.20	29000.	490.0	3.7	0	16558.
37.1						

Wave Travel Time 2L/c (ms) 9.663

Pile and Soil Model Total Capacity Rut
(kips) 361.6

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.240	15370	0.010	0.000	0.85	0.0	0.000	0.100	3.33	3.7	21.2
2	0.240	15370	0.000	0.000	1.00	0.5	0.150	0.100	6.67	3.7	21.2
3	0.240	15370	0.000	0.000	1.00	3.8	0.150	0.100	10.00	3.7	21.2
4	0.240	15370	0.000	0.000	1.00	7.6	0.150	0.100	13.33	3.7	21.2
5	0.240	15370	0.000	0.000	1.00	10.9	0.150	0.100	16.67	3.7	21.2
6	0.240	15370	0.000	0.000	1.00	11.4	0.150	0.100	20.00	3.7	21.2
9	0.240	15370	0.000	0.000	1.00	13.1	0.150	0.100	30.00	3.7	21.2
10	0.240	15370	0.000	0.000	1.00	17.1	0.150	0.100	33.33	3.7	21.2
15	0.240	15370	0.000	0.000	1.00	17.6	0.150	0.100	50.00	3.7	21.2
16	0.240	15370	0.000	0.000	1.00	18.6	0.150	0.100	53.33	3.7	21.2

```
  20  0.240    15370 0.000 0.000 1.00    16.4   0.150 0.100
66.67   3.7    21.2
  21  0.240    15370 0.000 0.000 1.00    15.9   0.150 0.100
70.00   3.7    21.2
  24  0.240    15370 0.000 0.000 1.00    15.9   0.150 0.100
80.00   3.7    21.2
 Toe                                     34.0   0.150 0.110

      5.771 kips total unreduced pile weight (g= 32.17 ft/s2)
      5.774 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     75.00     10.57      1.00     0.800
```

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
361.6	27.8	7.89	7.87	-0.13	23	7	39.24	3	2	42.0
										35.5

Pier 2
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
4.5	8.4	3.5	5.0	0.0	0.000	0.000	10.57	0.0
6.7	14.9	7.6	7.3	Hammer did not run				
11.3	32.6	21.6	11.0	1.6	14.038	-1.399	3.55	50.0
17.3	53.1	42.1	11.0	2.3	18.959	-2.939	4.06	49.1
23.3	73.6	62.6	11.0	3.4	22.646	-2.568	4.49	46.3
29.3	108.3	92.2	16.0	5.4	26.459	-1.074	5.08	42.9
35.3	139.1	123.0	16.0	7.4	28.844	-1.386	5.50	40.9
41.3	169.9	153.8	16.0	9.3	30.774	-1.849	5.92	39.4
47.3	210.2	186.1	24.0	12.7	33.076	-0.740	6.45	38.3
48.7	217.7	193.6	24.0	13.4	33.527	-0.603	6.53	38.1
53.3	243.7	219.7	24.0	15.8	34.404	-0.514	6.75	36.8
55.0	253.0	229.0	24.0	16.6	35.022	-0.564	6.89	36.7
56.7	262.4	238.3	24.0	17.2	35.551	-0.603	7.02	36.6
59.0	275.4	251.4	24.0	18.1	36.227	-0.626	7.20	36.6
75.0	361.6	327.6	34.0	27.8	39.237	-0.131	7.89	35.5

Total Driving Time 17 minutes; Total No. of Blows 761
Starting at penetration 4.5 ft

Table of Depths Analyzed with Driving System Modifiers

Depth	Length	Temp. Wait Time	Equivalent Pressure Stroke	Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
4.50	80.00	0.00	10.57	1.00	0.80	1.00	1.00
6.67	80.00	0.00	10.57	1.00	0.80	1.00	1.00
11.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
17.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
23.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
29.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
35.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
41.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
47.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
48.67	80.00	0.00	10.57	1.00	0.80	1.00	1.00
53.33	80.00	0.00	10.57	1.00	0.80	1.00	1.00
55.00	80.00	0.00	10.57	1.00	0.80	1.00	1.00
56.67	80.00	0.00	10.57	1.00	0.80	1.00	1.00
59.00	80.00	0.00	10.57	1.00	0.80	1.00	1.00
75.00	80.00	0.00	10.57	1.00	0.80	1.00	1.00

Soil Layer Resistance Values

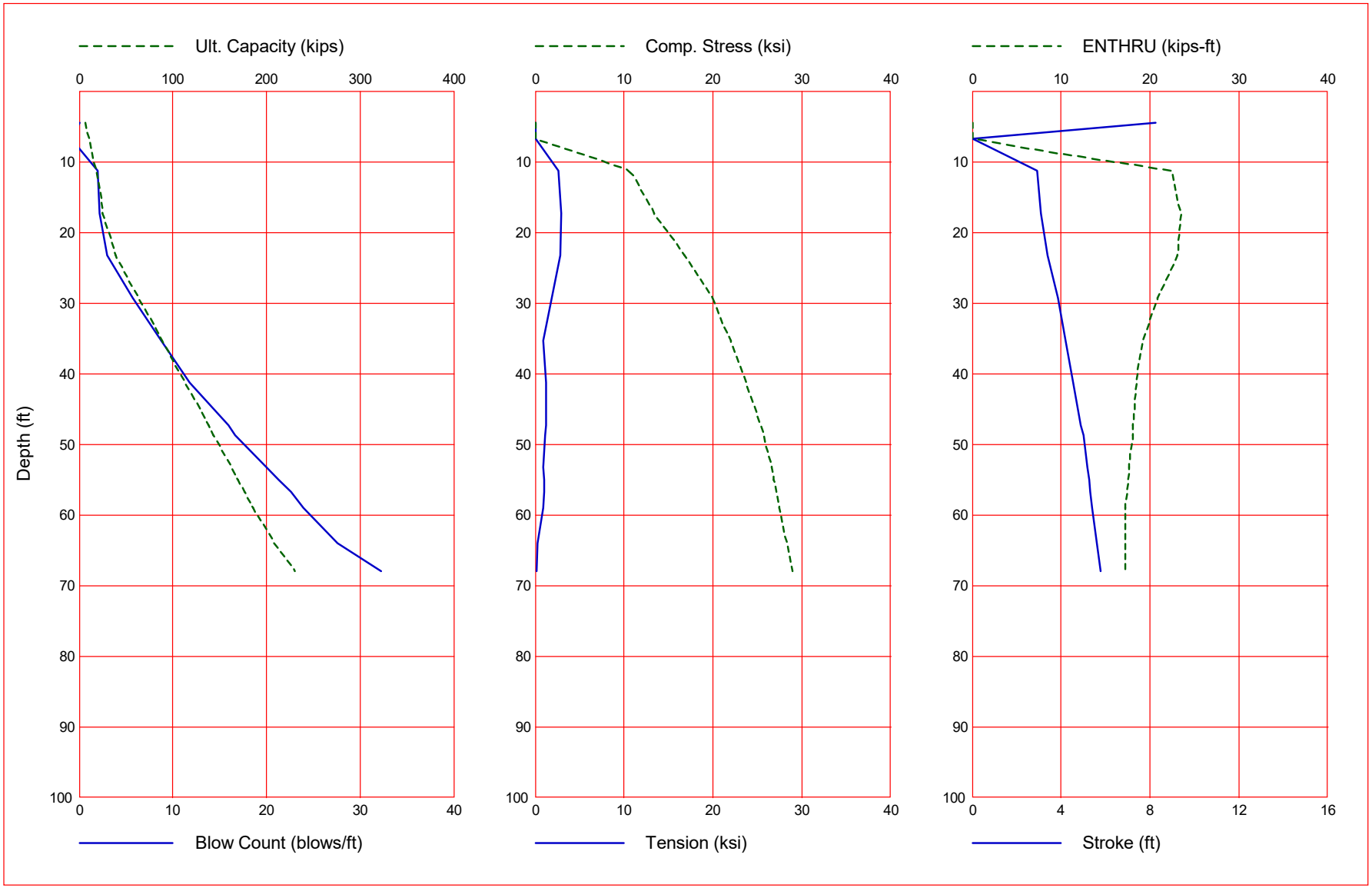
Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Setup Distance	Time

ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd ft	hrs
0.00	0.00	0.00	0.100	0.110	0.150	0.150	0.000	6.000 0.000
10.00	0.93	11.01	0.100	0.170	0.150	0.150	1.000	6.000 168.000
10.00	0.93	11.01	0.100	0.170	0.150	0.150	1.000	6.000 168.000
24.00	0.93	11.01	0.100	0.170	0.150	0.150	1.000	6.000 168.000
24.00	1.40	16.03	0.100	0.140	0.150	0.150	1.000	6.000 168.000
44.00	1.40	16.03	0.100	0.140	0.150	0.150	1.000	6.000 168.000
44.00	1.52	24.04	0.100	0.120	0.150	0.150	1.000	6.000 168.000
59.00	1.52	24.04	0.100	0.120	0.150	0.150	1.000	6.000 168.000
59.00	1.30	33.98	0.100	0.110	0.150	0.150	1.000	6.000 168.000
78.00	1.30	33.98	0.100	0.110	0.150	0.150	1.000	6.000 168.000
80.00	1.30	33.98	0.100	0.110	0.150	0.150	1.000	6.000 168.000

Terracon Consultants, Inc
Temp - Rear Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Terracon Consultants, Inc
Temp - Rear Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
4.5	6.7	0.7	6.0	0.0	0.000	0.000	8.27	0.0
6.7	10.4	1.6	8.9	-1.0	0.000	0.000	0.00	0.0
11.3	18.5	4.5	14.0	2.0	10.707	-2.602	2.91	22.4
17.3	25.3	11.3	14.0	2.2	13.396	-2.954	3.10	23.5
23.3	38.9	26.5	12.4	3.0	16.761	-2.805	3.41	23.1
29.3	63.7	50.3	13.4	5.7	19.979	-1.874	3.87	20.8
35.3	88.4	74.0	14.4	8.8	21.980	-0.939	4.21	19.3
41.3	113.2	97.8	15.4	11.8	23.765	-1.202	4.56	18.5
47.3	137.9	121.5	16.4	15.9	25.288	-1.219	4.90	18.1
48.7	143.5	126.8	16.6	16.7	25.761	-1.076	5.02	18.1
53.3	162.7	145.3	17.4	20.0	26.579	-0.947	5.20	17.7
55.0	169.6	151.9	17.7	21.3	26.851	-1.040	5.26	17.5
56.7	176.5	158.5	18.0	22.6	27.114	-1.029	5.32	17.4
59.0	186.1	167.7	18.3	23.9	27.474	-0.857	5.41	17.2
64.0	208.1	189.1	19.0	27.6	28.335	-0.268	5.62	17.2
68.0	230.1	211.1	19.0	32.3	28.974	-0.165	5.78	17.2

Total Continuous Driving Time 14.00 minutes; Total Number of Blows 729 (starting at penetration 4.5 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

Input File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD BRIDGE - N6175053\5 - TEMPORARY REAR ABUTMENT\TEMP REAR ABUTMENT.GWW
Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource \HAMMER2010.GW
Hammer File Version: 2003 (12/4/2018)

Input File Contents

Temp - Rear Abutment

OUT	OSG	HAM	STR	FUL	PEL	N	SPL	N-U	P-D	%SK	ISM	0	PHI	RSA	ITR	H-D	MXT	DEx
-100	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000

Pile g	Hammer g	Toe Area	Pile Size	Pile Type
32.185	32.185	153.930	14.000	Pipe

W Cp	A Cp	E Cp	T Cp	CoR	ROut	StCp
1.700	227.000	530.0	2.000	0.800	0.010	0.0

A Cu	E Cu	T Cu	CoR	ROut	StCu
0.000	0.0	0.000	0.000	0.000	0.0

LPle	APle	EPle	WPle	Peri	CI	CoR	ROut
73.000	17.09	29000.0	490.000	3.665	0	0.850	0.010

FFatigue	F0	0-Bottom
0	0.000	0.000

Manufac	Hmr Name	HmrType	No Seg-s
DELMAG	D 22	1	4

Ram Wt	Ram L	Ram Dia	MaxStrk	RtdStrk	Efficy
4.91	111.69	15.33	9.50	8.27	0.80

IB. Wt	IB. L	IB.Dia	IB CoR	IB RO
1.60	24.70	15.33	0.900	0.010

CompStrk	A Chamber	V Chamber	C Delay	C Duratn	Exp Coeff	VolCStart	Vol CEnd
11.22	184.58	197.70	0.0020	0.0020	1.250	0.00	0.00

P atm	P1	P2	P3	P4	P5
14.70	1250.00	0.00	0.00	0.00	0.00

Stroke	Effic.	Pressure	R-Weight	T-Delay	Exp-Coeff	Eps-Str	Total-AW
8.2700	0.8000	1250.0000	0.0000	0.0000	0.0000	0.0100	0.0000

Qs	Qt	Js	Jt	Qx	Jx	Rati	Dept
0.100	0.140	0.100	0.150	0.000	0.000	0.000	0.000

Research Soil Model: Atoe, Plug, Gap, Q-fac

0.000	0.000	0.000	0.000

Research Soil Model: RD-skn: m, d, toe: m, d

0.000	0.000	0.000	0.000

```
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt    SU F
LimL    TSf0
    0.00    0.00      0.00    0.00    0.00    0.00    0.00   0.00
6.00   0.000
   10.50    0.20     14.00    0.10    0.20    0.10    0.15   1.20
6.00  24.000
   10.50    0.20     14.00    0.10    0.20    0.10    0.15   1.20
6.00  24.000
   21.00    0.50     14.00    0.10    0.20    0.10    0.15   1.20
6.00  24.000
   21.00    1.08     11.97    0.10    0.16    0.15    0.15   1.50
6.00 168.000
   63.00    1.08     19.02    0.10    0.16    0.15    0.15   1.50
6.00 168.000
   63.00    1.50     19.02    0.10    0.16    0.15    0.15   1.50
6.00 168.000
   72.00    1.51     19.02    0.10    0.16    0.15    0.15   1.50
6.00 168.000
   73.00    1.51     19.02    0.10    0.16    0.15    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
     Dpth         L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      4.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      6.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     11.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     17.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     23.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     29.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     35.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     41.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     47.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     48.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

```
     53.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     55.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     56.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     59.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     64.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     68.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      0.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Temp - Rear Abutment

Hammer Model: D 22 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	1.227				
2	1.227	191698.2	1.000	0.0000	
3	1.227	191698.2	1.000	0.0000	
4	1.227	191698.2	1.000	0.0000	
Imp Block	1.600	101718.7	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	8.6
Combined Pile Top		12446.8			

HAMMER OPTIONS:
Hammer File ID No. 6 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 4.91 Ram Length (inch) 111.69
Maximum Stroke (ft) 9.50
Rated Stroke (ft) 8.27 Efficiency 0.800

Maximum Pressure (psi) 1250.00 Actual Pressure (psi) 1250.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 15.33
Combustion Delay (s) 0.00200 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

Elastic-Modulus	(ksi)	530.0	Elastic-Modulus	(ksi) 0.0
Thickness	(inch)	2.00	Thickness	(inch) 0.00
Coeff of Restitution		0.8	Coeff of Restitution	1.0
RoundOut	(ft)	0.0	RoundOut	(ft) 0.0
Stiffness	(kips/in)	60155.0	Stiffness	(kips/in) 0.0

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 4.5 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
73.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 6.7

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop Perim ft	Area ft	Area in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	69.68	3.7	17.1
22	0.193	12447	0.000	0.000	1.00	0.7	0.100	0.100	73.00	3.7	17.1
Toe						6.0	0.150	0.166			

4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
4.247 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.599
Driveability Analysis

```
  Soil Damping Option            Smith
  Max No Analysis Iterations         0  Time Increment/Critical
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      4.50      8.27      1.00     0.800


 INITIAL STATIC ANALYSIS: Total Wt, Sum(R)     7.5     6.7
  Hammer+Pile Weight > Rult: Pile Runs
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
6.7	0.0	8.27	0.00	0.00	1	0	0.00	1	0	0.0	88.9

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 6.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
73.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 10.4

No.	Weight LbTop kips	Stiffn Perim k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Area ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
20	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	66.36	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	0.4	0.100	0.100	69.68	3.7	17.1
22	0.193	12447	0.000	0.000	1.00	1.2	0.100	0.100	73.00	3.7	17.1
Toe						8.9	0.150	0.178			

4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
4.247 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
6.67	8.27	1.00	0.800

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
10.4	Hammer did not run										

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 11.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
73.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut (kips) 18.5

No.	Weight LbTop kips	Stiffn Perim k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Area ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
19	0.193	12447	0.000	0.000	1.00	0.1	0.100	0.100	63.05	3.7	17.1
20	0.193	12447	0.000	0.000	1.00	0.7	0.100	0.100	66.36	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	1.5	0.100	0.100	69.68	3.7	17.1
22	0.193	12447	0.000	0.000	1.00	2.3	0.100	0.100	73.00	3.7	17.1
Toe						14.0	0.150	0.200			

4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
4.247 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

```
11.33       8.27       1.00      0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct Bl Rt	Stroke (ft)		Ten Str	i	t	Comp Str	i	t
kips	b/ft	down	up	ksi			ksi		
18.5	2.0	2.91	2.93	-2.60	5	13	10.71	1	2

kip-ft	b/min
22.4	69.2

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 17.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.
73.0	17.09	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
29.9
29.9

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 25.3

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
17	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	56.41	3.7	17.1
18	0.193	12447	0.000	0.000	1.00	0.6	0.100	0.100	59.73	3.7	17.1
19	0.193	12447	0.000	0.000	1.00	1.3	0.100	0.100	63.05	3.7	17.1
20	0.193	12447	0.000	0.000	1.00	2.1	0.100	0.100	66.36	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	3.1	0.100	0.100	69.68	3.7	17.1
22	0.193	12447	0.000	0.000	1.00	4.2	0.100	0.100	73.00	3.7	17.1
Toe						14.0	0.150	0.200			

4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
4.247 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
17.33	8.27	1.00	0.800

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
25.3	2.2	3.10	3.08	-2.95	5	13	13.40	1	2	67.3

kip-ft
23.5

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 23.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 38.9

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
15	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	49.77	3.7	17.1
16	0.193	12447	0.000	0.000	1.00	0.4	0.100	0.100	53.09	3.7	17.1
17	0.193	12447	0.000	0.000	1.00	1.2	0.100	0.100	56.41	3.7	17.1
18	0.193	12447	0.000	0.000	1.00	1.9	0.100	0.100	59.73	3.7	17.1
19	0.193	12447	0.000	0.000	1.00	2.9	0.100	0.100	63.05	3.7	17.1
20	0.193	12447	0.000	0.000	1.00	4.0	0.100	0.100	66.36	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	5.2	0.100	0.100	69.68	3.7	17.1
22	0.193	12447	0.000	0.000	1.00	11.0	0.142	0.100	73.00	3.7	17.1

Toe 12.4 0.150 0.160

4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
4.247 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
23.33	8.27	1.00	0.800

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
38.9	3.0	3.41	3.37	-2.80	4	13	16.76	4	3	64.2

kip-ft
23.1

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 29.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 63.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
14	0.193	12447	0.000	0.000	1.00	0.3	0.100	0.100	46.45	3.7	17.1
15	0.193	12447	0.000	0.000	1.00	1.0	0.100	0.100	49.77	3.7	17.1
16	0.193	12447	0.000	0.000	1.00	1.8	0.100	0.100	53.09	3.7	17.1
17	0.193	12447	0.000	0.000	1.00	2.7	0.100	0.100	56.41	3.7	17.1
18	0.193	12447	0.000	0.000	1.00	3.8	0.100	0.100	59.73	3.7	17.1
19	0.193	12447	0.000	0.000	1.00	4.9	0.100	0.100	63.05	3.7	17.1
20	0.193	12447	0.000	0.000	1.00	9.5	0.135	0.100	66.36	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	69.68	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     13.4   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     29.33      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
63.7	5.7	3.87	3.84	-1.87	5	13	19.98	14	5	60.2

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 35.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 88.4

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	0.2	0.100	0.100	39.82	3.7	17.1
13	0.193	12447	0.000	0.000	1.00	0.9	0.100	0.100	43.14	3.7	17.1
14	0.193	12447	0.000	0.000	1.00	1.7	0.100	0.100	46.45	3.7	17.1
15	0.193	12447	0.000	0.000	1.00	2.5	0.100	0.100	49.77	3.7	17.1
16	0.193	12447	0.000	0.000	1.00	3.6	0.100	0.100	53.09	3.7	17.1
17	0.193	12447	0.000	0.000	1.00	4.7	0.100	0.100	56.41	3.7	17.1
18	0.193	12447	0.000	0.000	1.00	8.1	0.126	0.100	59.73	3.7	17.1
19	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	63.05	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     14.4   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     35.33      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
88.4	8.8	4.21	4.25	-0.94	16	50	21.98	14	5	19.3 57.3

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 41.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 113.2

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	0.1	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	0.7	0.100	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	1.5	0.100	0.100	39.82	3.7	17.1
13	0.193	12447	0.000	0.000	1.00	2.3	0.100	0.100	43.14	3.7	17.1
14	0.193	12447	0.000	0.000	1.00	3.3	0.100	0.100	46.45	3.7	17.1
15	0.193	12447	0.000	0.000	1.00	4.5	0.100	0.100	49.77	3.7	17.1
16	0.193	12447	0.000	0.000	1.00	6.5	0.113	0.100	53.09	3.7	17.1
17	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	56.41	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     15.4   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     41.33      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
113.2	11.8	4.56	4.59	-1.20	13	46	23.77	12	4	55.0
										kip-ft
										18.5

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 47.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 137.9

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	0.6	0.100	0.100	29.86	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	1.4	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	2.1	0.100	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	3.1	0.100	0.100	39.82	3.7	17.1
13	0.193	12447	0.000	0.000	1.00	4.3	0.100	0.100	43.14	3.7	17.1
14	0.193	12447	0.000	0.000	1.00	5.4	0.100	0.100	46.45	3.7	17.1
15	0.193	12447	0.000	0.000	1.00	12.7	0.148	0.100	49.77	3.7	17.1

```
  16  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
53.09   3.7    17.1
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     16.4   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     47.33      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
137.9	15.9	4.90	4.91	-1.22	10	40	25.29	10	4	53.2
										18.1

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 48.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 143.5

No. Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop Perim	Area						
kips	k/in	ft	ft		kips	s/ft	inch
ft ft	in2						
1 0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100
3.32 3.7	17.1						
2 0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100
6.64 3.7	17.1						
8 0.193	12447	0.000	0.000	1.00	0.2	0.100	0.100
26.55 3.7	17.1						
9 0.193	12447	0.000	0.000	1.00	0.9	0.100	0.100
29.86 3.7	17.1						
10 0.193	12447	0.000	0.000	1.00	1.7	0.100	0.100
33.18 3.7	17.1						
11 0.193	12447	0.000	0.000	1.00	2.5	0.100	0.100
36.50 3.7	17.1						
12 0.193	12447	0.000	0.000	1.00	3.6	0.100	0.100
39.82 3.7	17.1						
13 0.193	12447	0.000	0.000	1.00	4.7	0.100	0.100
43.14 3.7	17.1						
14 0.193	12447	0.000	0.000	1.00	8.2	0.127	0.100
46.45 3.7	17.1						
15 0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100
49.77 3.7	17.1						

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     16.6   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     48.67      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
143.5	16.7	5.02	4.97	-1.08	13	38	25.76	9	3	52.7

kip-ft
18.1

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 53.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 162.7

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
6	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	19.91	3.7	17.1
7	0.193	12447	0.000	0.000	1.00	0.4	0.100	0.100	23.23	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	1.2	0.100	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	2.0	0.100	0.100	29.86	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	2.9	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	4.1	0.100	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	5.2	0.100	0.100	39.82	3.7	17.1
13	0.193	12447	0.000	0.000	1.00	11.3	0.143	0.100	43.14	3.7	17.1

```
  14  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
46.45   3.7    17.1
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     17.4   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     53.33      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
162.7	20.0	5.20	5.17	-0.95	9	32	26.58	8	3	17.7	51.8

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 55.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 169.6

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
6	0.193	12447	0.000	0.000	1.00	0.1	0.100	0.100	19.91	3.7	17.1
7	0.193	12447	0.000	0.000	1.00	0.8	0.100	0.100	23.23	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	1.6	0.100	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	2.4	0.100	0.100	29.86	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	3.5	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	4.6	0.100	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	7.5	0.122	0.100	39.82	3.7	17.1
13	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	43.14	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     17.7   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     55.00      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
169.6	21.3	5.26	5.24	-1.04	9	32	26.85	8	3	51.4

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 56.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 176.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
5	0.193	12447	0.000	0.000	1.00	0.0	0.100	0.100	16.59	3.7	17.1
6	0.193	12447	0.000	0.000	1.00	0.4	0.100	0.100	19.91	3.7	17.1
7	0.193	12447	0.000	0.000	1.00	1.2	0.100	0.100	23.23	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	2.0	0.100	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	2.9	0.100	0.100	29.86	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	4.1	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	5.2	0.100	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	11.3	0.143	0.100	39.82	3.7	17.1

```
  13  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
43.14   3.7    17.1
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     18.0   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     56.67      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
176.5	22.6	5.32	5.31	-1.03	9	32	27.11	8	3	51.1
										17.4

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 59.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 186.1

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.0	0.000	0.100	6.64	3.7	17.1
5	0.193	12447	0.000	0.000	1.00	0.2	0.100	0.100	16.59	3.7	17.1
6	0.193	12447	0.000	0.000	1.00	1.0	0.100	0.100	19.91	3.7	17.1
7	0.193	12447	0.000	0.000	1.00	1.8	0.100	0.100	23.23	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	2.6	0.100	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	3.7	0.100	0.100	29.86	3.7	17.1
10	0.193	12447	0.000	0.000	1.00	4.9	0.100	0.100	33.18	3.7	17.1
11	0.193	12447	0.000	0.000	1.00	9.1	0.133	0.100	36.50	3.7	17.1
12	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	39.82	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
73.00   3.7    17.1
 Toe                                     18.3   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     59.00      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
186.1	23.9	5.41	5.40	-0.86	9	32	27.47	7	3	17.2	50.6

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 64.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558. 29.9
73.0	17.09	29000.	490.0	3.7	0	16558. 29.9

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 208.1

No.	Weight LbTop	Perim	Stiffn Area	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
	kips	ft	k/in in2	ft	ft		kips	s/ft	inch
1	0.193	3.32	12447 17.1	0.010	0.000	0.85	0.0	0.000	0.100
2	0.193	6.64	12447 17.1	0.000	0.000	1.00	0.0	0.000	0.100
3	0.193	9.95	12447 17.1	0.000	0.000	1.00	0.0	0.100	0.100
4	0.193	13.27	12447 17.1	0.000	0.000	1.00	0.6	0.100	0.100
5	0.193	16.59	12447 17.1	0.000	0.000	1.00	1.4	0.100	0.100
6	0.193	19.91	12447 17.1	0.000	0.000	1.00	2.1	0.100	0.100
7	0.193	23.23	12447 17.1	0.000	0.000	1.00	3.2	0.100	0.100
8	0.193	26.55	12447 17.1	0.000	0.000	1.00	4.3	0.100	0.100
9	0.193	29.86	12447 17.1	0.000	0.000	1.00	5.5	0.100	0.100
10	0.193	33.18	12447 17.1	0.000	0.000	1.00	12.8	0.149	0.100

```
  11  0.193    12447 0.000 0.000 1.00    13.1   0.150 0.100
36.50   3.7    17.1
  22  0.193    12447 0.000 0.000 1.00    14.7   0.150 0.100
73.00   3.7    17.1
 Toe                                     19.0   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     64.00      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
208.1	27.6	5.62	5.61	-0.27	21	7	28.34	5	3	17.2	49.8

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 68.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
73.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 8.817

Pile and Soil Model Total Capacity Rut
(kips) 230.1

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.193	12447	0.010	0.000	0.85	0.0	0.000	0.100	3.32	3.7	17.1
2	0.193	12447	0.000	0.000	1.00	0.1	0.100	0.100	6.64	3.7	17.1
3	0.193	12447	0.000	0.000	1.00	0.8	0.100	0.100	9.95	3.7	17.1
4	0.193	12447	0.000	0.000	1.00	1.5	0.100	0.100	13.27	3.7	17.1
5	0.193	12447	0.000	0.000	1.00	2.3	0.100	0.100	16.59	3.7	17.1
6	0.193	12447	0.000	0.000	1.00	3.4	0.100	0.100	19.91	3.7	17.1
7	0.193	12447	0.000	0.000	1.00	4.5	0.100	0.100	23.23	3.7	17.1
8	0.193	12447	0.000	0.000	1.00	6.8	0.116	0.100	26.55	3.7	17.1
9	0.193	12447	0.000	0.000	1.00	13.1	0.150	0.100	29.86	3.7	17.1
21	0.193	12447	0.000	0.000	1.00	15.7	0.150	0.100	69.68	3.7	17.1

```
  22  0.193    12447 0.000 0.000 1.00    18.3   0.150 0.100
73.00   3.7    17.1
 Toe                                     19.0   0.150 0.160

      4.245 kips total unreduced pile weight (g= 32.17 ft/s2)
      4.247 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
     68.00      8.27      1.00     0.800
```

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
230.1	32.3	5.78	5.78	-0.17	4	50	28.97	4	2	17.2 49.0

Temp - Rear Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth	Rut	Frictn	End Bg	Bl Ct	Com Str	Ten Str	Stroke	ENTHRU
ft	kips	kips	kips	bl/ft	ksi	ksi	ft	kip-ft
4.5	6.7	0.7	6.0	0.0	0.000	0.000	8.27	0.0
6.7	10.4	1.6	8.9	Hammer did not run				
11.3	18.5	4.5	14.0	2.0	10.707	-2.602	2.91	22.4
17.3	25.3	11.3	14.0	2.2	13.396	-2.954	3.10	23.5
23.3	38.9	26.5	12.4	3.0	16.761	-2.805	3.41	23.1
29.3	63.7	50.3	13.4	5.7	19.979	-1.874	3.87	20.8
35.3	88.4	74.0	14.4	8.8	21.980	-0.939	4.21	19.3
41.3	113.2	97.8	15.4	11.8	23.765	-1.202	4.56	18.5
47.3	137.9	121.5	16.4	15.9	25.288	-1.219	4.90	18.1
48.7	143.5	126.8	16.6	16.7	25.761	-1.076	5.02	18.1
53.3	162.7	145.3	17.4	20.0	26.579	-0.947	5.20	17.7
55.0	169.6	151.9	17.7	21.3	26.851	-1.040	5.26	17.5
56.7	176.5	158.5	18.0	22.6	27.114	-1.029	5.32	17.4
59.0	186.1	167.7	18.3	23.9	27.474	-0.857	5.41	17.2
64.0	208.1	189.1	19.0	27.6	28.335	-0.268	5.62	17.2
68.0	230.1	211.1	19.0	32.3	28.974	-0.165	5.78	17.2

Total Driving Time 14 minutes; Total No. of Blows 729
Starting at penetration 4.5 ft

Table of Depths Analyzed with Driving System Modifiers

Depth	Length	Temp. Wait Time	Equivalent Pressure Stroke	Ratio	Efficy.	Stiffn. Factor	Cushion CoR
ft	ft	hr	ft				
4.50	73.00	0.00	8.27	1.00	0.80	1.00	1.00
6.67	73.00	0.00	8.27	1.00	0.80	1.00	1.00
11.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
17.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
23.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
29.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
35.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
41.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
47.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
48.67	73.00	0.00	8.27	1.00	0.80	1.00	1.00
53.33	73.00	0.00	8.27	1.00	0.80	1.00	1.00
55.00	73.00	0.00	8.27	1.00	0.80	1.00	1.00
56.67	73.00	0.00	8.27	1.00	0.80	1.00	1.00
59.00	73.00	0.00	8.27	1.00	0.80	1.00	1.00
64.00	73.00	0.00	8.27	1.00	0.80	1.00	1.00
68.00	73.00	0.00	8.27	1.00	0.80	1.00	1.00

Soil Layer Resistance Values

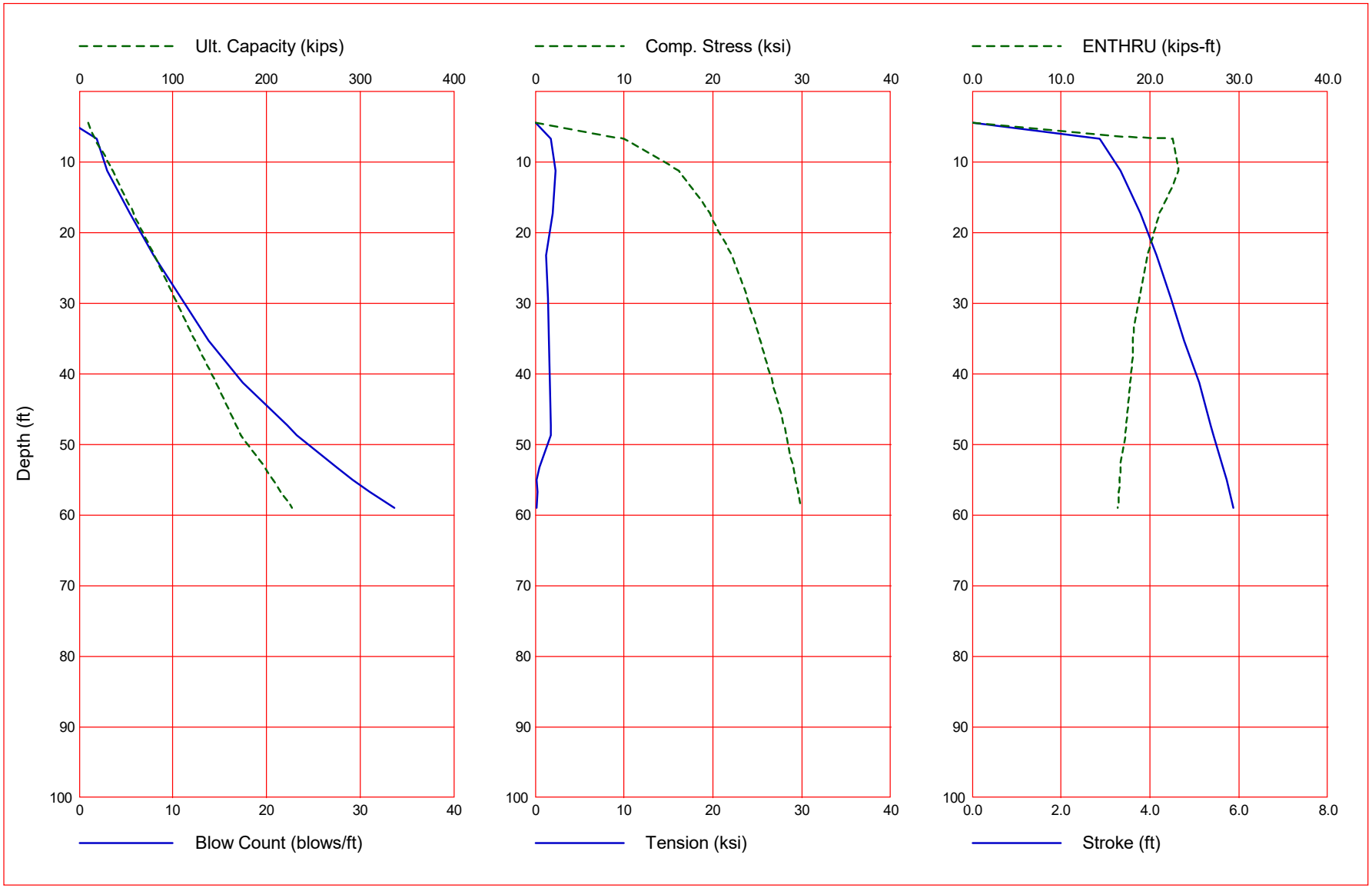
Shaft	End	Shaft	Toe	Shaft	Toe	Soil Limit	Setup

Depth	Res.	Bearing	Quake	Quake	Damping	Damping	Setup	Distance	Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs
0.00	0.00	0.00	0.100	0.140	0.100	0.150	0.000	6.000	0.000
10.50	0.20	14.00	0.100	0.200	0.100	0.150	0.500	6.000	24.000
10.50	0.20	14.00	0.100	0.200	0.100	0.150	0.500	6.000	24.000
21.00	0.50	14.00	0.100	0.200	0.100	0.150	0.500	6.000	24.000
21.00	1.08	11.97	0.100	0.160	0.150	0.150	1.000	6.000	168.000
63.00	1.08	19.02	0.100	0.160	0.150	0.150	1.000	6.000	168.000
63.00	1.50	19.02	0.100	0.160	0.150	0.150	1.000	6.000	168.000
72.00	1.51	19.02	0.100	0.160	0.150	0.150	1.000	6.000	168.000
73.00	1.51	19.02	0.100	0.160	0.150	0.150	1.000	6.000	168.000

Terracon Consultants, Inc
Temp - Forward Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000



Terracon Consultants, Inc
Temp - Forward Abutment

May 19 2021
GRLWEAP Version 2010

Gain/Loss 1 at Shaft and Toe 1.000 / 1.000

Depth ft	Ultimate Capacity kips	Friction kips	End Bearing kips	Blow Count blows/ft	Comp. Stress ksi	Tension Stress ksi	Stroke ft	ENTHRU kips-ft
4.5	9.6	4.1	5.5	-1.0	0.000	0.000	0.00	0.0
6.7	17.2	9.1	8.2	1.9	9.970	-1.709	2.86	22.6
11.3	36.0	25.0	11.0	3.0	16.111	-2.273	3.34	23.2
17.3	58.0	47.0	11.0	5.4	19.636	-1.945	3.78	21.1
23.3	80.0	69.0	11.0	7.9	22.160	-1.250	4.15	19.7
29.3	102.0	91.0	11.0	10.9	23.892	-1.463	4.46	18.8
35.3	124.0	113.0	11.0	13.8	25.335	-1.506	4.76	18.1
41.3	146.0	135.0	11.0	17.5	26.773	-1.631	5.10	17.8
47.3	168.0	157.0	11.0	22.2	27.951	-1.744	5.36	17.3
48.7	172.9	161.9	11.0	23.2	28.167	-1.793	5.42	17.2
53.3	198.4	182.4	16.0	27.5	29.063	-0.492	5.64	16.7
55.0	207.0	190.9	16.0	29.2	29.311	-0.203	5.72	16.6
56.7	215.5	199.5	16.0	31.0	29.649	-0.249	5.79	16.5
59.0	227.5	211.5	16.0	33.7	29.893	-0.194	5.88	16.4

Total Continuous Driving Time 14.00 minutes; Total Number of Blows 742 (starting at penetration 4.5 ft)

GRLWEAP - Version 2010
WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS

written by GRL Engineers, Inc. (formerly Goble Rausche Likins and Associates, Inc.) with cooperation from Pile Dynamics, Inc.

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ABOUT THE WAVE EQUATION ANALYSIS RESULTS

The GRLWEAP program simulates the behavior of a preformed pile driven by either an impact hammer or a vibratory hammer. The program is based on mathematical models, which describe motion and forces of hammer, driving system, pile and soil under the hammer action. Under certain conditions, the models only crudely approximate, often complex, dynamic situations.

A wave equation analysis generally relies on input data, which represents normal situations. In particular, the hammer data file supplied with the program assumes that the hammer is in good working order. All of the input data selected by the user may be the best available information at the time when the analysis is performed. However, input data and therefore results may significantly differ from actual field conditions.

Therefore, the program authors recommend prudent use of the GRLWEAP results. Soil response and hammer performance should be verified by static and/or dynamic testing and measurements. Estimates of bending or other local stresses (e.g., helmet or clamp contact, uneven rock surfaces etc.), prestress effects and others must also be accounted for by the user.

The calculated capacity - blow count relationship, i.e. the bearing graph, should be used in conjunction with observed blow counts for the capacity

assessment of a driven pile. Soil setup occurring after pile installation may produce bearing capacity values that differ substantially from those expected from a wave equation analysis due to soil setup or relaxation. This is particularly true for pile driven with vibratory hammers. The GRLWEAP user must estimate such effects and should also use proper care when applying blow counts from restrike because of the variability of hammer energy, soil resistance and blow count during early restriking.

Finally, the GRLWEAP capacities are ultimate values. They MUST be reduced by means of an appropriate factor of safety to yield a design or working load. The selection of a factor of safety should consider the quality of the construction control, the variability of the site conditions, uncertainties in the loads, the importance of building and other factors.

Input File: N:\SHARE\GRL WEAP\WEAP ANALYSIS - OLD ROCKSIDE ROAD BRIDGE - N6175053\6 - TEMPORARY FORWARD ABUTMENT\TEMP FORWARD ABUTMENT.GWW
Hammer File: C:\ProgramData\PDI\GRLWEAP\2010\Resource \HAMMER2010.GW
Hammer File Version: 2003 (12/4/2018)

Input File Contents

Temp - Forward Abutment

OUT	OSG	HAM	STR	FUL	PEL	N	SPL	N-U	P-D	%SK	ISM	0	PHI	RSA	ITR	H-D	MXT	DEx
-100	0	6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000

Pile g	Hammer g	Toe Area	Pile Size	Pile Type
32.185	32.185	153.930	14.000	Pipe

W Cp	A Cp	E Cp	T Cp	CoR	ROut	StCp
1.700	227.000	530.0	2.000	0.800	0.010	0.0

A Cu	E Cu	T Cu	CoR	ROut	StCu
0.000	0.0	0.000	0.000	0.000	0.0

LPle	APle	EPle	WPle	Peri	CI	CoR	ROut
64.000	17.09	29000.0	490.000	3.665	0	0.850	0.010

FFatigue	F0	0-Bottom
0	0.000	0.000

Manufac	Hmr Name	HmrType	No Seg-s
DELMAG	D 22	1	4

Ram Wt	Ram L	Ram Dia	MaxStrk	RtdStrk	Efficy
4.91	111.69	15.33	9.50	8.27	0.80

IB. Wt	IB. L	IB.Dia	IB CoR	IB RO
1.60	24.70	15.33	0.900	0.010

CompStrk	A Chamber	V Chamber	C Delay	C Duratn	Exp Coeff	VolCStart	Vol CEnd
11.22	184.58	197.70	0.0020	0.0020	1.250	0.00	0.00

P atm	P1	P2	P3	P4	P5
14.70	1250.00	0.00	0.00	0.00	0.00

Stroke	Effic.	Pressure	R-Weight	T-Delay	Exp-Coeff	Eps-Str	Total-AW
8.2700	0.8000	1250.0000	0.0000	0.0000	0.0000	0.0100	0.0000

Qs	Qt	Js	Jt	Qx	Jx	Rati	Dept
0.100	0.140	0.150	0.150	0.000	0.000	0.000	0.000

Research Soil Model: Atoe, Plug, Gap, Q-fac

0.000	0.000	0.000	0.000

Research Soil Model: RD-skn: m, d, toe: m, d

0.000	0.000	0.000	0.000

```
  Research Toe Plug: Res-int, Q-int, D-int, Res-plug, Q-plug, D-
plug
     0.000     0.000     0.000     0.000     0.000     0.000
  Research Toe Plug: RD plug toe: m, d
     0.000     0.000
  Research Toe Plug: New Toe Plug Model is NOT applied
  Res. Distribution
    Dpth    Rskn      Rtoe      Qs      Qt      Js      Jt    SU F
LimL    TSf0
    0.00    0.00      0.00    0.00    0.00    0.00    0.00   0.00
6.00 168.000
    9.00    1.00     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
    9.00    1.00     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
   51.00    1.00     11.01    0.10    0.17    0.15    0.15   1.50
6.00 168.000
   51.00    1.40     16.03    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   61.00    1.40     16.03    0.10    0.14    0.15    0.15   1.50
6.00 168.000
   64.00    1.40     16.03    0.10    0.14    0.15    0.15   1.50
6.00 168.000
  Gain/Loss factors: shaft and toe
   1.00000   0.00000   0.00000   0.00000   0.00000
   1.00000   0.00000   0.00000   0.00000   0.00000
      Dpth         L      Wait      Strk      Pmx%      Eff.
Stff       CoR
      4.50      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      6.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     11.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     17.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     23.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     29.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     35.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     41.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     47.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     48.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     53.33      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     55.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

```
     56.67      0.00      0.00     0.000       0.0     0.000
0.000     0.000
     59.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
      0.00      0.00      0.00     0.000       0.0     0.000
0.000     0.000
```

GRLWEAP: WAVE EQUATION ANALYSIS OF PILE FOUNDATIONS
Version 2010
English Units

Temp - Forward Abutment

Hammer Model: D 22 Made by: DELMAG

No.	Weight kips	Stiffn k/inch	CoR	C-Slk ft	Dampg k/ft/s
1	1.227				
2	1.227	191698.2	1.000	0.0000	
3	1.227	191698.2	1.000	0.0000	
4	1.227	191698.2	1.000	0.0000	
Imp Block	1.600	101718.7	0.900	0.0100	
Helmet	1.700	60155.0	0.800	0.0098	8.6
Combined Pile Top		12261.2			

HAMMER OPTIONS:
Hammer File ID No. 6 Hammer Type OE Diesel
Stroke Option FxdP-VarS Stroke Convergence Crit. 0.010
Fuel Pump Setting Maximum

HAMMER DATA:
Ram Weight (kips) 4.91 Ram Length (inch) 111.69
Maximum Stroke (ft) 9.50
Rated Stroke (ft) 8.27 Efficiency 0.800

Maximum Pressure (psi) 1250.00 Actual Pressure (psi) 1250.00
Compression Exponent 1.350 Expansion Exponent 1.250
Ram Diameter (inch) 15.33
Combustion Delay (s) 0.00200 Ignition Duration (s) 0.00200

The Hammer Data Includes Estimated (NON-MEASURED) Quantities

HAMMER CUSHION PILE CUSHION
Cross Sect. Area (in2) 227.00 Cross Sect. Area (in2) 0.00

Elastic-Modulus	(ksi)	530.0	Elastic-Modulus	(ksi) 0.0
Thickness	(inch)	2.00	Thickness	(inch) 0.00
Coeff of Restitution		0.8	Coeff of Restitution	1.0
RoundOut	(ft)	0.0	RoundOut	(ft) 0.0
Stiffness	(kips/in)	60155.0	Stiffness	(kips/in) 0.0

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 4.5 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 9.6

No.	Weight LbTop kips	Stiffn Perim k/in	Area in2	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	ft
1	0.196	12261	0.010	0.000	0.85		0.0	0.000	0.100	3.37
2	0.196	12261	0.000	0.000	1.00		0.0	0.000	0.100	6.74
18	0.196	12261	0.000	0.000	1.00		0.3	0.150	0.100	60.63
19	0.196	12261	0.000	0.000	1.00		3.9	0.150	0.100	64.00
Toe							5.5	0.150	0.155	

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

PILE, SOIL, ANALYSIS OPTIONS:
Uniform pile Pile Segments: Automatic
No. of Slacks/Splices 0 Pile Damping
(%) 1
Pile Damping
Fact.(k/ft/s) 0.599
Driveability Analysis

```
  Soil Damping Option            Smith
  Max No Analysis Iterations         0  Time Increment/Critical
160
  Output Time Interval               1  Analysis Time-Input
(ms)         0
  Output Level: Normal
  Gravity Mass, Pile, Hammer:   32.170    32.185    32.185
  Output Segment Generation: Automatic

     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      4.50      8.27      1.00     0.800
```

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
9.6	Hammer did not run										

```
 Temp - Forward Abutment
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  Depth                  (ft)       6.7  Standard Soil Setup
  Shaft Gain/Loss Factor         1.000  Toe Gain/Loss Factor
1.000

  PILE PROFILE:
  Toe Area              (in2)   153.930  Pile Type
Pipe
  Pile Size            (inch)    14.000

   L b Top     Area    E-Mod  Spec Wt    Perim  C Index  Wave Sp
EA/c
        ft      in2      ksi   lb/ft3       ft              ft/s
k/ft/s
       0.0    17.09   29000.    490.0      3.7        0    16558.
29.9
      64.0    17.09   29000.    490.0      3.7        0    16558.
29.9

  Wave Travel Time 2L/c (ms)     7.730

         Pile and Soil Model            Total Capacity Rut
(kips)      17.2
 No. Weight   Stiffn C-Slk T-Slk  CoR  Soil-S  Soil-D Quake
LbTop Perim    Area
       kips     k/in    ft    ft         kips    s/ft  inch
ft    ft     in2
   1  0.196    12261 0.010 0.000 0.85     0.0   0.000 0.100
3.37   3.7    17.1
   2  0.196    12261 0.000 0.000 1.00     0.0   0.000 0.100
6.74   3.7    17.1
  18  0.196    12261 0.000 0.000 1.00     2.2   0.150 0.100
60.63   3.7    17.1
  19  0.196    12261 0.000 0.000 1.00     6.8   0.150 0.100
64.00   3.7    17.1
 Toe                                      8.2   0.150 0.162

      3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
      3.724 kips total reduced pile weight   (g= 32.19 ft/s2)


     Depth    Stroke  Pressure    Efficy
        ft        ft     Ratio
      6.67      8.27      1.00     0.800
```

Temp - Forward Abutment
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Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
17.2	1.9	2.86	2.84	-1.71	11	13	9.97	1	2	70.0

Temp - Forward Abutment
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Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 11.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut (kips) 36.0

No.	Weight LbTop kips	Stiffn Area k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	Perim ft	in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
16	0.196	12261	0.000	0.000	1.00	0.3	0.150	0.100	53.89	3.7	17.1
17	0.196	12261	0.000	0.000	1.00	4.0	0.150	0.100	57.26	3.7	17.1
18	0.196	12261	0.000	0.000	1.00	8.6	0.150	0.100	60.63	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.1	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy

```
11.33       8.27       1.00      0.800
```

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
36.0	3.0	3.34	3.31	-2.27	5	12	16.11	3	2	23.2	64.9

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 17.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 58.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
14	0.196	12261	0.000	0.000	1.00	0.0	0.150	0.100	47.16	3.7	17.1
15	0.196	12261	0.000	0.000	1.00	3.0	0.150	0.100	50.53	3.7	17.1
16	0.196	12261	0.000	0.000	1.00	7.6	0.150	0.100	53.89	3.7	17.1
17	0.196	12261	0.000	0.000	1.00	11.7	0.150	0.100	57.26	3.7	17.1
18	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	60.63	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
17.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
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Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
58.0	5.4	3.78	3.75	-1.95	5	12	19.64	15	5	60.9

kip-ft
21.1

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 23.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut (kips) 80.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
13	0.196	12261	0.000	0.000	1.00	2.0	0.150	0.100	43.79	3.7	17.1
14	0.196	12261	0.000	0.000	1.00	6.6	0.150	0.100	47.16	3.7	17.1
15	0.196	12261	0.000	0.000	1.00	11.1	0.150	0.100	50.53	3.7	17.1
16	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	53.89	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
23.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft b/min
80.0	7.9	4.15	4.14	-1.25	18	6	22.16	14	5	19.7 57.9

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 29.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 102.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
11	0.196	12261	0.000	0.000	1.00	1.2	0.150	0.100	37.05	3.7	17.1
12	0.196	12261	0.000	0.000	1.00	5.6	0.150	0.100	40.42	3.7	17.1
13	0.196	12261	0.000	0.000	1.00	10.2	0.150	0.100	43.79	3.7	17.1
14	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	47.16	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
29.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct Bl Rt	Stroke (ft)		Ten Str	i	t	Comp Str	i	t
kips	b/ft	down	up	ksi			ksi		
102.0	10.9	4.46	4.49	-1.46	18	6	23.89	12	4

kip-ft	b/min
18.8	55.7

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 35.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor 1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut (kips) 124.0

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
9	0.196	12261	0.000	0.000	1.00	0.6	0.150	0.100	30.32	3.7	17.1
10	0.196	12261	0.000	0.000	1.00	4.6	0.150	0.100	33.68	3.7	17.1
11	0.196	12261	0.000	0.000	1.00	9.2	0.150	0.100	37.05	3.7	17.1
12	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	40.42	3.7	17.1
13	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	43.79	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
35.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU kips	Bl Ct b/ft	Stroke (ft) down	Stroke (ft) up	Ten Str ksi	i	t	Comp Str ksi	i	t	Bl Rt kip-ft	b/min
124.0	13.8	4.76	4.78	-1.51	18	6	25.33	10	4	18.1	53.9

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 41.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
64.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 146.0

No. Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake
LbTop Perim	Area						
kips	k/in	ft	ft		kips	s/ft	inch
ft ft	in2						
1 0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100
3.37 3.7	17.1						
2 0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100
6.74 3.7	17.1						
7 0.196	12261	0.000	0.000	1.00	0.2	0.150	0.100
23.58 3.7	17.1						
8 0.196	12261	0.000	0.000	1.00	3.6	0.150	0.100
26.95 3.7	17.1						
9 0.196	12261	0.000	0.000	1.00	8.2	0.150	0.100
30.32 3.7	17.1						
10 0.196	12261	0.000	0.000	1.00	12.0	0.150	0.100
33.68 3.7	17.1						
11 0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100
37.05 3.7	17.1						
19 0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100
64.00 3.7	17.1						
Toe					11.0	0.150	0.170

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
41.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
146.0	17.5	5.10	5.05	-1.63	18	6	26.77	8	3	17.8
	52.3									

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 47.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
ft	in2	ksi	lb/ft3	ft		ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.
64.0	17.09	29000.	490.0	3.7	0	16558.

EA/c
k/ft/s
29.9
29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 168.0

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
5	0.196	12261	0.000	0.000	1.00	0.0	0.150	0.100	16.84	3.7	17.1
6	0.196	12261	0.000	0.000	1.00	2.5	0.150	0.100	20.21	3.7	17.1
7	0.196	12261	0.000	0.000	1.00	7.2	0.150	0.100	23.58	3.7	17.1
8	0.196	12261	0.000	0.000	1.00	11.5	0.150	0.100	26.95	3.7	17.1
9	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	30.32	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	64.00	3.7	17.1
Toe						11.0	0.150	0.170			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
47.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut ENTHRU	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	Bl Rt
kips	b/ft	down	up	ksi			ksi			b/min
168.0	22.2	5.36	5.34	-1.74	18	6	27.95	7	3	50.9

kip-ft
17.3

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 48.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp EA/c
ft	in2	ksi	lb/ft3	ft		ft/s k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558. 29.9
64.0	17.09	29000.	490.0	3.7	0	16558. 29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 172.9

No.	Weight LbTop	Stiffn Perim	C-Slk Area	T-Slk	CoR	Soil-S	Soil-D	Quake
	kips	k/in	ft	ft		kips	s/ft	inch
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100
3.37	3.7	17.1						
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100
6.74	3.7	17.1						
5	0.196	12261	0.000	0.000	1.00	0.5	0.150	0.100
16.84	3.7	17.1						
6	0.196	12261	0.000	0.000	1.00	4.4	0.150	0.100
20.21	3.7	17.1						
7	0.196	12261	0.000	0.000	1.00	9.0	0.150	0.100
23.58	3.7	17.1						
8	0.196	12261	0.000	0.000	1.00	12.2	0.150	0.100
26.95	3.7	17.1						
9	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100
30.32	3.7	17.1						
19	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100
64.00	3.7	17.1						
Toe						11.0	0.150	0.170

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
48.67	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
172.9	23.2	5.42	5.40	-1.79	18	6	28.17	6	3	17.2	50.7

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 53.3 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 198.4

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
4	0.196	12261	0.000	0.000	1.00	1.6	0.150	0.100	13.47	3.7	17.1
5	0.196	12261	0.000	0.000	1.00	6.2	0.150	0.100	16.84	3.7	17.1
6	0.196	12261	0.000	0.000	1.00	10.7	0.150	0.100	20.21	3.7	17.1
7	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	23.58	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	15.8	0.150	0.100	64.00	3.7	17.1
Toe						16.0	0.150	0.140			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
53.33	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
198.4	27.5	5.64	5.63	-0.49	18	6	29.06	5	3	16.7	49.7

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 55.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
64.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 207.0

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
3	0.196	12261	0.000	0.000	1.00	0.2	0.150	0.100	10.11	3.7	17.1
4	0.196	12261	0.000	0.000	1.00	3.8	0.150	0.100	13.47	3.7	17.1
5	0.196	12261	0.000	0.000	1.00	8.4	0.150	0.100	16.84	3.7	17.1
6	0.196	12261	0.000	0.000	1.00	12.1	0.150	0.100	20.21	3.7	17.1
7	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	23.58	3.7	17.1
18	0.196	12261	0.000	0.000	1.00	13.3	0.150	0.100	60.63	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	17.3	0.150	0.100	64.00	3.7	17.1
Toe						16.0	0.150	0.140			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
55.00	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
207.0	29.2	5.72	5.72	-0.20	18	6	29.31	4	2	16.6	49.3

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 56.7 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top ft	Area in2	E-Mod ksi	Spec Wt lb/ft3	Perim ft	C Index	Wave Sp ft/s	EA/c k/ft/s
0.0	17.09	29000.	490.0	3.7	0	16558.	29.9
64.0	17.09	29000.	490.0	3.7	0	16558.	29.9

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 215.5

No.	Weight kips	Stiffn k/in	C-Slk ft	T-Slk ft	CoR	Soil-S kips	Soil-D s/ft	Quake inch	LbTop ft	Perim ft	Area in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.0	0.000	0.100	6.74	3.7	17.1
3	0.196	12261	0.000	0.000	1.00	1.6	0.150	0.100	10.11	3.7	17.1
4	0.196	12261	0.000	0.000	1.00	6.1	0.150	0.100	13.47	3.7	17.1
5	0.196	12261	0.000	0.000	1.00	10.7	0.150	0.100	16.84	3.7	17.1
6	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	20.21	3.7	17.1
18	0.196	12261	0.000	0.000	1.00	15.7	0.150	0.100	60.63	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	17.3	0.150	0.100	64.00	3.7	17.1
Toe						16.0	0.150	0.140			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth	Stroke	Pressure	Efficy
ft	ft	Ratio	
56.67	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
215.5	31.0	5.79	5.79	-0.25	4	50	29.65	4	2	16.5	49.0

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Depth (ft) 59.0 Standard Soil Setup
Shaft Gain/Loss Factor 1.000 Toe Gain/Loss Factor
1.000

PILE PROFILE:
Toe Area (in2) 153.930 Pile Type
Pipe
Pile Size (inch) 14.000

L b Top	Area	E-Mod	Spec Wt	Perim	C Index	Wave Sp
EA/c						
ft	in2	ksi	lb/ft3	ft		ft/s
k/ft/s						
0.0	17.09	29000.	490.0	3.7	0	16558.
29.9						
64.0	17.09	29000.	490.0	3.7	0	16558.
29.9						

Wave Travel Time 2L/c (ms) 7.730

Pile and Soil Model Total Capacity Rut
(kips) 227.5

No.	Weight	Stiffn	C-Slk	T-Slk	CoR	Soil-S	Soil-D	Quake	LbTop	Perim	Area
	kips	k/in	ft	ft		kips	s/ft	inch	ft	ft	in2
1	0.196	12261	0.010	0.000	0.85	0.0	0.000	0.100	3.37	3.7	17.1
2	0.196	12261	0.000	0.000	1.00	0.6	0.150	0.100	6.74	3.7	17.1
3	0.196	12261	0.000	0.000	1.00	4.7	0.150	0.100	10.11	3.7	17.1
4	0.196	12261	0.000	0.000	1.00	9.3	0.150	0.100	13.47	3.7	17.1
5	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	16.84	3.7	17.1
6	0.196	12261	0.000	0.000	1.00	12.3	0.150	0.100	20.21	3.7	17.1
17	0.196	12261	0.000	0.000	1.00	14.2	0.150	0.100	57.26	3.7	17.1
18	0.196	12261	0.000	0.000	1.00	17.3	0.150	0.100	60.63	3.7	17.1
19	0.196	12261	0.000	0.000	1.00	17.3	0.150	0.100	64.00	3.7	17.1
Toe						16.0	0.150	0.140			

3.722 kips total unreduced pile weight (g= 32.17 ft/s2)
3.724 kips total reduced pile weight (g= 32.19 ft/s2)

Depth ft	Stroke ft	Pressure Ratio	Efficy
59.00	8.27	1.00	0.800

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Rut	Bl Ct	Stroke (ft)		Ten Str	i	t	Comp Str	i	t	ENTHRU	Bl Rt
kips	b/ft	down	up	ksi			ksi			kip-ft	b/min
227.5	33.7	5.88	5.88	-0.19	3	49	29.89	3	2	16.4	48.7

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

SUMMARY OVER DEPTHS

G/L at Shaft and Toe: 1.000 1.000

Depth ft	Rut kips	Frictn kips	End Bg kips	Bl Ct bl/ft	Com Str ksi	Ten Str ksi	Stroke ft	ENTHRU kip-ft
4.5	9.6	4.1	5.5	Hammer did not run				
6.7	17.2	9.1	8.2	1.9	9.970	-1.709	2.86	22.6
11.3	36.0	25.0	11.0	3.0	16.111	-2.273	3.34	23.2
17.3	58.0	47.0	11.0	5.4	19.636	-1.945	3.78	21.1
23.3	80.0	69.0	11.0	7.9	22.160	-1.250	4.15	19.7
29.3	102.0	91.0	11.0	10.9	23.892	-1.463	4.46	18.8
35.3	124.0	113.0	11.0	13.8	25.335	-1.506	4.76	18.1
41.3	146.0	135.0	11.0	17.5	26.773	-1.631	5.10	17.8
47.3	168.0	157.0	11.0	22.2	27.951	-1.744	5.36	17.3
48.7	172.9	161.9	11.0	23.2	28.167	-1.793	5.42	17.2
53.3	198.4	182.4	16.0	27.5	29.063	-0.492	5.64	16.7
55.0	207.0	190.9	16.0	29.2	29.311	-0.203	5.72	16.6
56.7	215.5	199.5	16.0	31.0	29.649	-0.249	5.79	16.5
59.0	227.5	211.5	16.0	33.7	29.893	-0.194	5.88	16.4

Total Driving Time 14 minutes; Total No. of Blows 742
Starting at penetration 4.5 ft

Temp - Forward Abutment
05/19/2021
Terracon Consultants, Inc GRLWEAP
Version 2010

Table of Depths Analyzed with Driving System Modifiers

Depth	Temp. Length	Wait Time	Equivalent Pressure Stroke	Ratio	Stiffn. Factor	Cushion Efficy. CoR
ft	ft	hr	ft			
4.50	64.00	0.00	8.27	1.00	0.80	1.00
6.67	64.00	0.00	8.27	1.00	0.80	1.00
11.33	64.00	0.00	8.27	1.00	0.80	1.00
17.33	64.00	0.00	8.27	1.00	0.80	1.00
23.33	64.00	0.00	8.27	1.00	0.80	1.00
29.33	64.00	0.00	8.27	1.00	0.80	1.00
35.33	64.00	0.00	8.27	1.00	0.80	1.00
41.33	64.00	0.00	8.27	1.00	0.80	1.00
47.33	64.00	0.00	8.27	1.00	0.80	1.00
48.67	64.00	0.00	8.27	1.00	0.80	1.00
53.33	64.00	0.00	8.27	1.00	0.80	1.00
55.00	64.00	0.00	8.27	1.00	0.80	1.00
56.67	64.00	0.00	8.27	1.00	0.80	1.00
59.00	64.00	0.00	8.27	1.00	0.80	1.00

Soil Layer Resistance Values

Depth	Shaft Res.	End Bearing	Shaft Quake	Toe Quake	Shaft Damping	Toe Damping	Soil Setup	Limit Setup Distance	Time
ft	k/ft2	kips	inch	inch	s/ft	s/ft	Normlzd	ft	hrs

```
    0.00    0.00    0.00   0.100   0.140   0.150   0.150   0.000
6.000 168.000
    9.00    1.00   11.01   0.100   0.170   0.150   0.150   1.000
6.000 168.000
    9.00    1.00   11.01   0.100   0.170   0.150   0.150   1.000
6.000 168.000
   51.00    1.00   11.01   0.100   0.170   0.150   0.150   1.000
6.000 168.000
   51.00    1.40   16.03   0.100   0.140   0.150   0.150   1.000
6.000 168.000
   61.00    1.40   16.03   0.100   0.140   0.150   0.150   1.000
6.000 168.000
   64.00    1.40   16.03   0.100   0.140   0.150   0.150   1.000
6.000 168.000
```

SHALLOW FOUNDATION BEARING RESISTANCE
RETAINING WALL

Gross Bearing Capacity

PROJECT INFORMATION

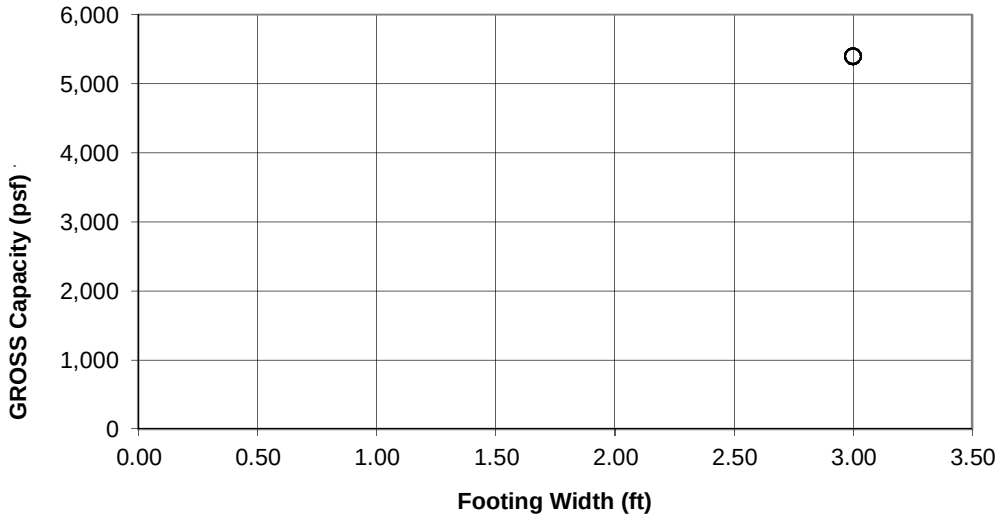
Project Name:	Old Rockside Road Bridge Replacement
Project Number:	N6175053
Notes:	Retaining Wall Footing, B-004, Undrained
Date:	May 21, 2021

Soil Properties, Footing Dimensions, and Groundwater

Symbol	Value	Units	Definition
c	1000	psf	Cohesion
f	0	degrees	Drained Friction Angle
g_{above}	115	pcf	Unit Weight of Soil above Footing
g_{below}	115	pcf	Unit Weight of Soil below Footing
D_f	3.5	feet	Depth of Footing from Ground Surface
D_w	0	feet	Depth to Groundwater from Ground Surface
B_{min}	3	feet	Minimum Footing Width
B_{max}	3	feet	Maximum Footing Width
L	92	feet	Footing Length

☑ Check if the soils above the footing are as competent as those below the footing.

☐ Check if local or punching shear is possible. See Figure C10.6.3.1.2b-1 on the Instructions sheet.



Notes

1. Calculations are based on Section 10.6.3.1.2 of AASHTO 2010 (Vesic factors).
2. User can differentiate between soil unit weight above and below footing.
3. Inclination factors are assumed to be 1.0. User must manually input overides.
4. Values for d_q are linearly interpolated based on D_f/B and f (see Table 10.6.3.1.2a-4).
5. See Calculation Sheet for a summary of all other variables.

Shallow Foundation Bearing Capacity (Gross)

PROJECT INFORMATION

Project Name:	**Old Rockside Road Bridge Replacement**
Project Number:	**N6175053**
Notes:	**Retaining Wall Footing, B-004, Undrained**
Date:	**May 21, 2021**

Governing Equations

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma \quad BN_{\gamma m} C_{w\gamma}$$

$$N_{cm} = N_c s_c i_c$$

$$N_{qm} = N_q s_q d_q i_q$$

$$N_\gamma m = N_\gamma s_\gamma i_\gamma$$

See the instructions sheet for a definition of variables.

Parameter Values and Results of Equations for GROSS Capacity

Design phi = 0	Width = 3'
c	1000
N_c	5.14
s_c	1.01
i_c	1.00
$cN_cs_ci_c$	5,191

g_{above}	115
D_f	3.50
N_q	1.00
s_q	1.00
d_q	1.00
i_q	1.00
C_{wq}	0.50
$g_{above}D_fN_qs_qd_qi_qC_{wq}$	201

g_{below}	115
B	3.00
N_g	0.00
s_g	1.00
i_g	1.00
C_{wg}	0.50
$0.5g_{below}BN_gs_gi_gC_{wg}$	0

	Width = 3'
Ultimate (psf)	**5,393**
Factored Bearing Resistance = 0.55	**2,966**

Gross Bearing Capacity

PROJECT INFORMATION

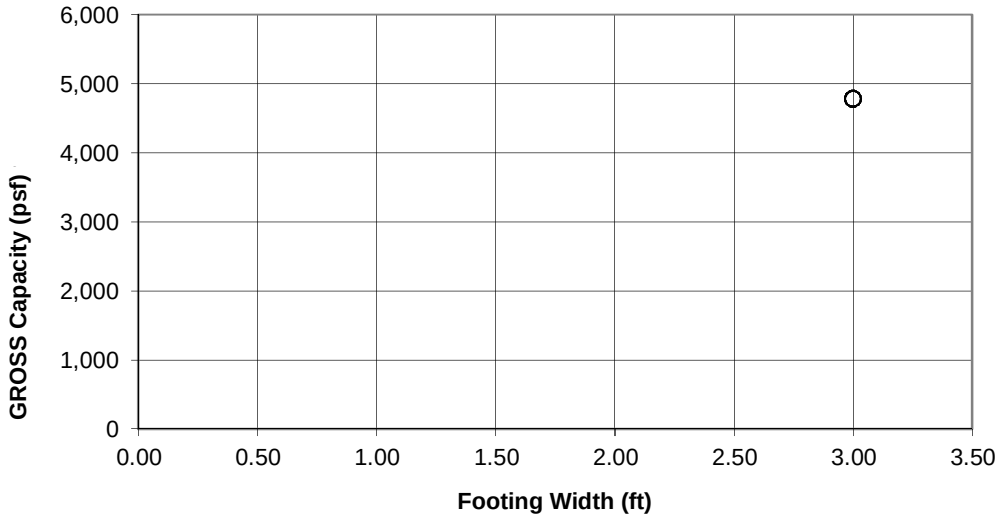
Project Name:	Old Rockside Road Bridge Replacement
Project Number:	N6175053
Notes:	Retaining Wall Footing, B-004, Drained
Date:	May 21, 2021

Soil Properties, Footing Dimensions, and Groundwater

Symbol	Value	Units	Definition
c	125	psf	Cohesion
f	23	degrees	Drained Friction Angle
g_{above}	115	pcf	Unit Weight of Soil above Footing
g_{below}	115	pcf	Unit Weight of Soil below Footing
D_f	3.5	feet	Depth of Footing from Ground Surface
D_w	0	feet	Depth to Groundwater from Ground Surface
B_{min}	3	feet	Minimum Footing Width
B_{max}	3	feet	Maximum Footing Width
L	92	feet	Footing Length

☑ Check if the soils above the footing are as competent as those below the footing.

☐ Check if local or punching shear is possible. See Figure C10.6.3.1.2b-1 on the Instructions sheet.



Notes

1. Calculations are based on Section 10.6.3.1.2 of AASHTO 2010 (Vesic factors).
2. User can differentiate between soil unit weight above and below footing.
3. Inclination factors are assumed to be 1.0. User must manually input overides.
4. Values for d_q are linearly interpolated based on D_f/B and f (see Table 10.6.3.1.2a-4).
5. See Calculation Sheet for a summary of all other variables.

Shallow Foundation Bearing Capacity (Gross)

PROJECT INFORMATION

Project Name:	**Old Rockside Road Bridge Replacement**
Project Number:	**N6175053**
Notes:	**Retaining Wall Footing, B-004, Drained**
Date:	**May 21, 2021**

Governing Equations

$$q_n = cN_{cm} + \gamma D_f N_{qm} C_{wq} + 0.5\gamma \quad BN_{\gamma m} C_{w\gamma}$$

$$N_{cm} = N_c s_c i_c$$

$$N_{qm} = N_q s_q d_q i_q$$

$$N_\gamma m = N_\gamma s_\gamma i_\gamma$$

See the instructions sheet for a definition of variables.

Parameter Values and Results of Equations for GROSS Capacity

Design phi = 23	Width = 3'
c	125
N_c	18.10
s_c	1.02
i_c	1.00
$cN_cs_ci_c$	2,308

g_{above}	115
D_f	3.50
N_q	8.70
s_q	1.01
d_q	1.00
i_q	1.00
C_{wq}	0.50
$g_{above}D_fN_qs_qd_qi_qC_{wq}$	1,768

g_{below}	115
B	3.00
N_g	8.20
s_g	0.99
i_g	1.00
C_{wg}	0.50
$0.5g_{below}BN_gs_gi_gC_{wg}$	700

	Width = 3'
Ultimate (psf)	**4,776**
Factored Bearing Resistance = 0.55	**2,627**

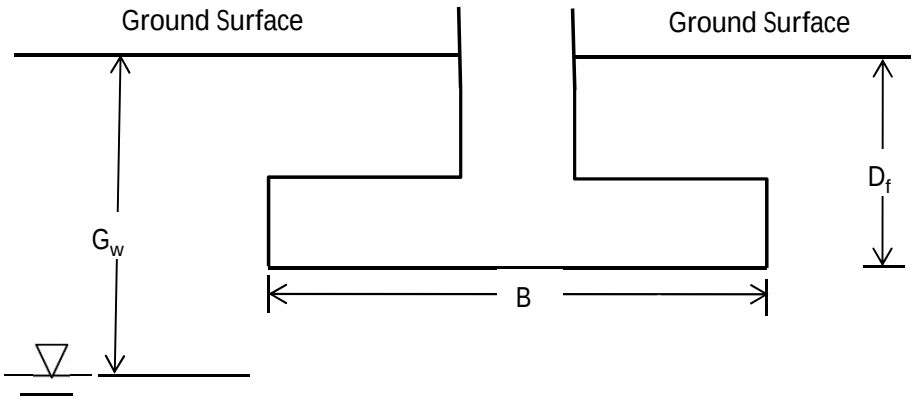
SHALLOW FOUNDATION SETTLEMENT
RETAINING WALL

Shallow Foundation Settlement

PROJECT INFORMATION

Project	Old Rockside Road Bridge Replacement
Project No.	N6175053
Notes/Location	B-004
Date	3/17/2021

Definition of Footing Variables



Footing Input Parameters

Symbol	Value	Units	Description
B_{min}	7.00	ft	Minimum Footing Width
B_{max}	7.00	ft	Maximum Footing Width
Footing length defined by:	(●) Fixed Footing Length ( ) Fixed Length to Width (L/B) Ratio		
Length	92.00	ft	Fixed Footing Length
D_f	3.50	ft	Depth of Footing (from ground surface)
G_w	0.00	ft	Depth to Groundwater (from ground surface)
Selected Analysis Method:	Fixed Pressure		
Pressure	2580	psf	Design bearing pressure
Stress Distribution Method:	Boussinesq		
Perform Analysis	***Click to Perform Analysis***		

Shallow Foundation Settlement

PROJECT INFORMATION

Project	Old Rockside Road Bridge Replacement
Project No.	N6175053
Notes/Location	B-004
Date	3/17/2021

Depth of Footing and Depth to Groundwater

Click to Analyze

Footing is 3.5 feet below the ground surface. Groundwater is 0 feet below the ground surface.

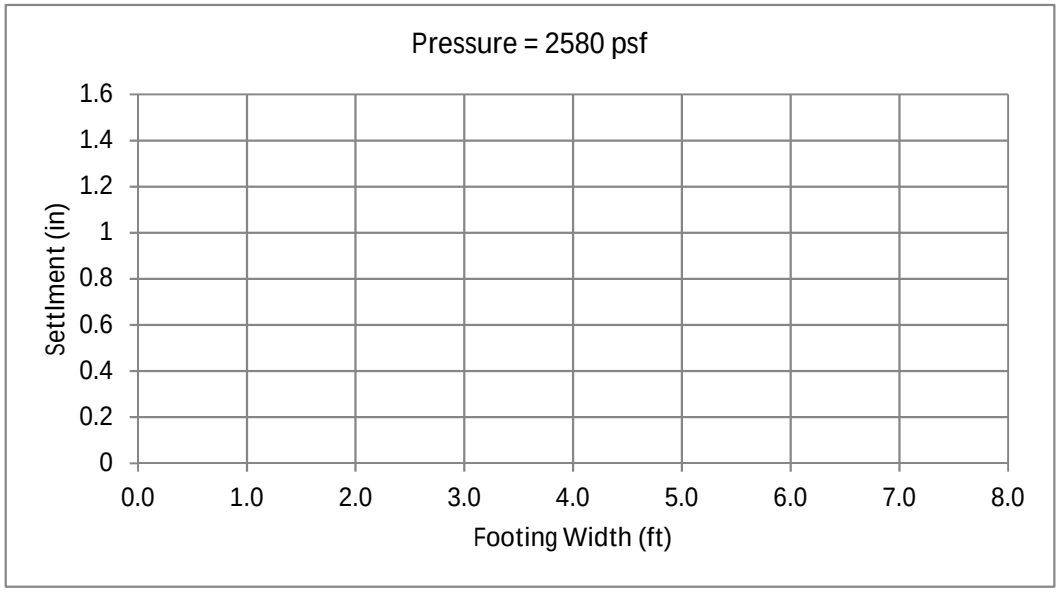
Soil Input Parameters

Top (ft)	Bottom (ft)	γ_{moist} (pcf)	Method	N-Value (corrected)	Hough Type	Cec	Cer	OCR
0.0	13.0	120	Direct			0.084	0.01	5.6
13.0	17.0	130	Hough	9	Well graded silty SAND & GRAVEL			
17.0	23.0	130	Direct			0.082	0.017	3.4
23.0	30.0	125	Direct			0.072	0.008	2.8
30.0	40.0	130	Direct			0.064	0.001	2.7

Settlement Results

PROJECT INFORMATION

Project	Old Rockside Road Bridge Replacement
Project No.	N6175053
Notes/Location	B-004
Date	3/17/2021



Boussinesq Stress Distribution Method

Dimensions, Pressure, and Settlement

Width (ft)	Length (ft)	Pressure (psf)	Settlement (in)
7	92	2580	1.4

Stress and Settlement Calculation Output

Project:	Old Rockside Road Bridge Replacement	Notes	B-004
Number:	N6175053	Date:	3/17/2021

Width (ft)	Length (ft)	Mid Point Depth (ft)	s_o' (psf)	s_p' (psf)	Ds' (psf)	s_f' (psf)	Settlement (in)
7.0	92.0	8.25	475	2661	1827	2302	0.8
7.0	92.0	15.00	884	884	941	1825	0.3
7.0	92.0	20.00	1222	4155	673	1895	0.2
7.0	92.0	26.50	1644	4603	484	2128	0.1
7.0	92.0	35.00	2201	5943	346	2547	0.0
					Boussinesq	Total=	1.4

$\sigma_p' = S_u / (0.11 + 0.0037\,PI)$ NAVFAC DM 7.1 CHAP 3 SECT 4 SUBSECT 3.6

COHESIVE LAYERS 1, 3, 4, 5

S_u	LAYER 1	1,150 psf	ANV HAND PEN
	LAYER 3	1,300 psf	ANV HAND PEN
	LAYER 4	1,100 psf	UCC TEST
	LAYER 5	1,100 psf	UCC TEST
PI	LAYER 1	13	
	LAYER 3	19	
	LAYER 4	11	
	LAYER 5	5	

σ_p'

LAYER 1 = 1,150 psf / (0.11 + 0.0037 (13)) = 7,274 psf

LAYER 3 = 1,300 psf / (0.11 + 0.0037 (19)) = 7,210 psf

LAYER 4 = 1,100 psf / (0.11 + 0.0037 (11)) = 7,299 psf

LAYER 5 = 1,100 psf / (0.11 + 0.0037 (5)) = 8,560 psf

σ_v'

7.7' x 120 PCF = 924 PSF (PRESENT MATERIAL ABOVE BEARING ELEV.)

LAYER 1 = 924 PSF + 6.5 FT (120 PSF - 62.4 PSF) = 1,298 PSF

LAYER 3 = 924 PSF + 13FT (120 PSF - 62.4 PSF) + 4 FT (130 PSF - 62.4 PSF)
+ 3FT (130 PSF - 62.4 PSF) = 2,146 PSF

σ_v' LAYER 4 = 924 PSF + 13 FT (120 PSF - 62.4 PSF) + 4 FT (130 PSF - 62.4 PSF)
+ 6 FT (130 PSF - 62.4 PSF) + 3.5 FT (125 PSF - 62.4 PSF) = 2,568 PSF

LAYER 5 = 924 PSF + 13 FT (120 PSF - 62.4 PSF) + 4 FT (130 PSF - 62.4 PSF)
+ 6 FT (130 PSF - 62.4 PSF) + 7 FT (125 PSF - 62.4 PSF) + 5 FT (130 PSF - 62.4 PSF)

= 3,125 PSF

$OCR = \sigma_p' / \sigma_v'$

LAYER 1 = 7,274 PSF / 1,298 PSF = 5.6

LAYER 3 = 7,210 PSF / 2,146 PSF = 3.4

LAYER 4 = 7,299 PSF / 2,568 PSF = 2.8

LAYER 5 = 8,560 PSF / 3,125 PSF = 2.7

$C_{cc} = C_c / (1 + e_o)$

e_o - INTERPOLATED FROM TRENDLINE PLOT OF AVAILABLE LABORATORY TEST RESULTS

LAYER 1 = 0.67 (MAXIMUM VALUE FROM TESTING)

LAYER 3 = 0.65

LAYER 4 = 0.62

LAYER 5 = 0.59

$C_c = -0.156 + 0.411\, e_o + 0.00058\, LL$ FROM AL-KHAFJI & ANDERSON (1992)

LL LAYER 1 = 36

LAYER 3 = 42

LAYER 4 = 31

LAYER 5 = 26

C_c

LAYER 1 = $-0.156 + 0.411\,(0.67) + 0.00058\,(36) = 0.1402$

LAYER 3 = $-0.156 + 0.411\,(0.65) + 0.00058\,(42) = 0.1355$

LAYER 4 = $-0.156 + 0.411\,(0.62) + 0.00058\,(31) = 0.1168$

LAYER 5 = $-0.156 + 0.411\,(0.59) + 0.00058\,(26) = 0.1016$

C_{ac}

LAYER 1 = $0.1402 / (1+0.67) = 0.084$

LAYER 3 = $0.1355 / (1+0.65) = 0.082$

LAYER 4 = $0.1168 / (1+0.62) = 0.072$

LAYER 5 = $0.1016 / (1+0.59) = 0.064$

$C_{cr} = C_r / (1+e_o)$ NAKASE ET. AL (1988)

$C_r = 0.00194\,(PI - 4.6)$

LAYER 1 = $0.00194\,(13-4.6) = 0.0163$

LAYER 3 = $0.00194\,(19-4.6) = 0.0279$

C_r

LAYER 4 = 0.00194 (11-4.6) = 0.0124

LAYER 5 = 0.00194 (5-4.6) = 0.0008

C_{er}

LAYER 1 = 0.0163 / (1+0.67) = 0.010

LAYER 3 = 0.0279 / (1+0.65) = 0.017

LAYER 4 = 0.0124 / (1+0.62) = 0.008

LAYER 5 = 0.0008 / (1+0.59) = 0.001

GLOBAL STABILITY ANALYSIS
RETAINING WALL

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Piezometric Line
	1 - A-4a V. Stiff (Long Term)	120	100	22	0	1
	2 - A-3a (Long Term)	120	0	28	0	1
	3 - A-6a Stiff (Long Term)	120	75	20	0	1
	Concrete Retaining Wall	150				1

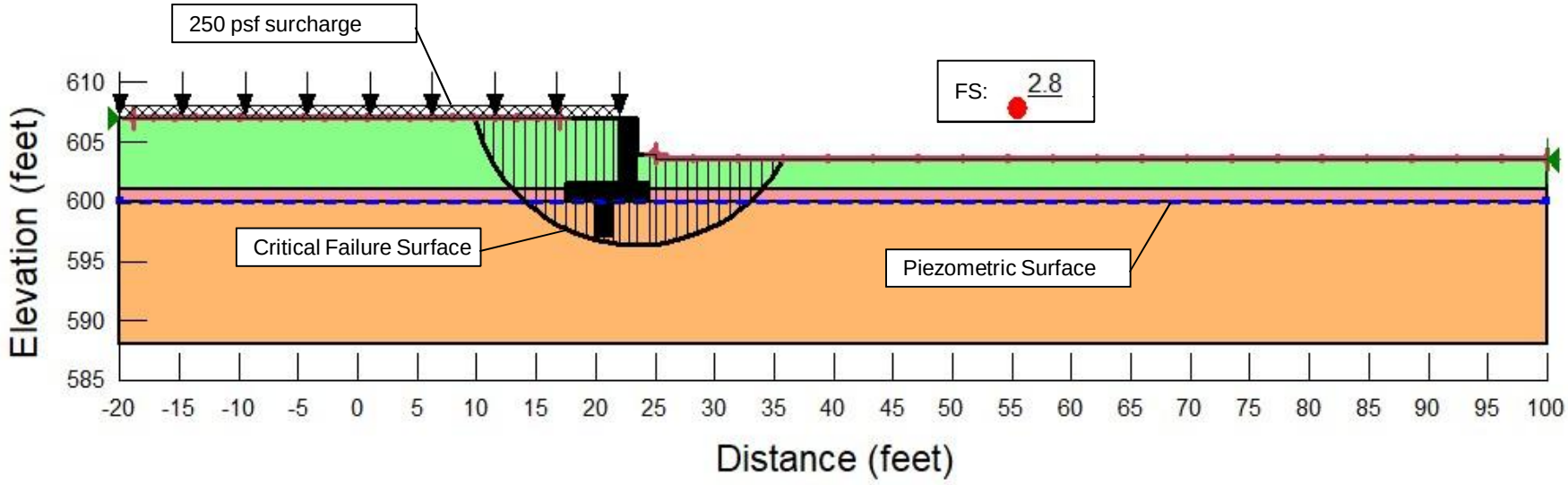


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: TD	Project No. N6175053
Drawn by: RMG	Scale: AS SHOWN
Checked by: TD	File Name: ST
Approved by: TD	Date: 9/7/2021

Terracon
611 Lunken Park Dr.
Cincinnati, OH 45226

SLOPE STABILITY – LONG-TERM (DRAINED)

Old Rockside Road Bridge Replacement
Independence and Valley View
Cuyahoga County, Ohio

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Phi-B (°)	Cohesion (psf)	Piezometric Line
	1 - A-4a V. Stiff (Short Term)	120				1,500	1
	2 - A-3a (Short Term)	120	0	28	0		1
	3 - A-6a Stiff (Short Term)	120				1,000	1
	Concrete Retaining Wal	150					1

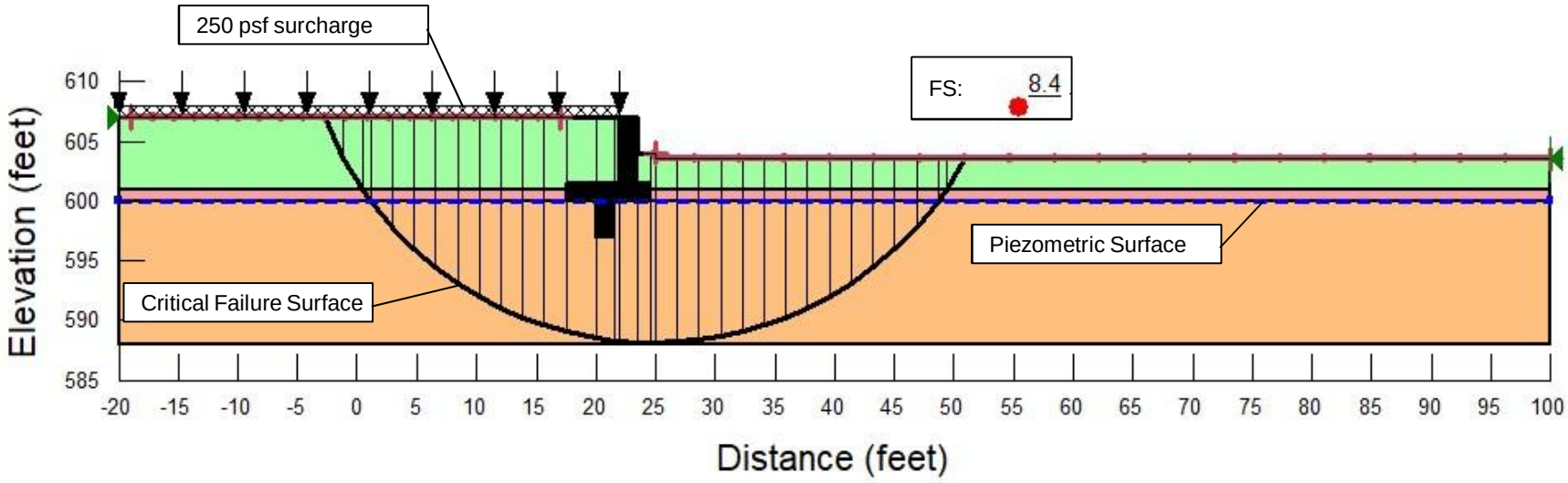


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	TD
Drawn by:	RMG
Checked by:	TD
Approved by:	TD

Project No.	N6175053
Scale:	AS SHOWN
File Name:	LT
Date:	9/7/2021

Terracon
611 Lunken Park Dr.
Cincinnati, OH 45226

SLOPE STABILITY – SHORT-TERM (UNDRAINED)

Old Rockside Road Bridge Replacement
Independence and Valley View
Cuyahoga County, Ohio

EMBANKMENT SETTLEMENT CALCULATIONS

PROJECT: OLD ROCKSIDE ROAD	DRILLING FIRM / OPERATOR: OTB / HEPNER	DRILL RIG: B-57 TRACK	STATION / OFFSET: 31+09, 34' RT.	EXPLORATION ID B-003-0-19
TYPE: BRIDGE	SAMPLING FIRM / LOGGER: OTB / HEPNER	HAMMER: CME AUTOMATIC	ALIGNMENT: PROJECT'S BASELINE	
PID: 91563 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 11/1/18	ELEVATION: 599.6 (MSL) EOB: 120.0 ft.	PAGE 1 OF 5
START: 5/20/19 END: 5/20/19	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 90*	LAT / LONG: 41.394500, -81.629530	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
	599.6																	
TOPSOIL (12")	598.6																	
MEDIUM STIFF TO STIFF, BROWN, **SANDY SILT**, CONTAINS ROOTLETS, MOIST		1 2 3 4 5 6 7 8	1 2 2	6	72	SS-1	2.75	-	-	-	-	-	-	-	-	24	A-4a (V)	
			1 1 1														-4a (5)	
			1 1 1	3	94												-4a (V)	
	591.6	W 591.6				SS-3B	2.00	-	-	-	-	-	-	-	-	38	A-4a (V)	
VERY LOOSE, DARK GRAY, **COARSE AND FINE SAND**, SOME GRAVEL, LITTLE SILT, WET	589.1	9 10	1 0 1	2	72	SS-4	-	22	21	38	14	5	NP	NP	NP	39	A-3a (0)	
MEDIUM DENSE, GRAY, **GRAVEL WITH SAND**, TRACE SILT, WET	587.1	11 12	4 6 2	12	17	SS-5	-	-	-	-	-	-	-	-	-	15	A-1-b (V)	
STIFF, GRAY, **SILTY CLAY**, MOIST		13	1															
			2 4														-6b (V)	
		14 15	3 4 5														6b (11)	
	582.6	16 17	3 4 6															
STIFF, GRAY, **SILT AND CLAY**, MOIST			2 4														6a (10)	
		18	4															
		19 20	2 4 5	14	94	SS-10	1.75	-	-	-	-	-	-	-	-	28	A-6a (V)	
		21 22	2 3 4														-6a (V)	
		23 24 25	2 3 5														-6a (V)	
		26 27	4 6 6	18	83	SS-13	1.25	-	-	-	-	-	-	-	-	24	A-6a (V)	

Soil layer 2
unit weight - 105pcf
average N60 - 4
Su - 1,750psf
LL- 25
PI - 5

Soil layer 3
unit weight - 125pcf
average N60 - 12
Su - 1,685psf
LL- 37
PI - 16

Soil layer 4
unit weight - 135pcf
average N60 - 14
Su - 1,300psf
LL- 31
PI - 11

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 9/18/20 09:53 - C:\USERS\RMGATERMANN\ONEDRIVE - TERRACON CONSULTANTS INC\DESKTOP\N6175053 REPLACEMENT (OI

PID: 91563 | SFN: | PROJECT: OLD ROCKSIDE ROAD | STATION / OFFSET: 31+09, 34' RT. | START: 5/20/19 | END: 5/20/19 | PG 2 OF 5 | B-003-0-19

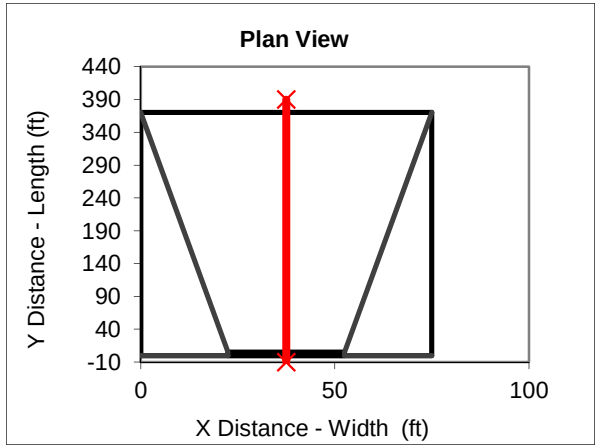
MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	HOLE SEALED
STIFF, GRAY, **SILT AND CLAY**, MOIST *(continued)*	571.6	29	3 4 5	14	89	SS-14	1.00	0	0	0	50	50	31	20	11	26	A-6a (8)	
MEDIUM STIFF TO VERY STIFF, GRAY, **SILT**, LITTLE TO SOME SILT, MOIST @31.0'; UU TEST RESULTS - SAMPLE DEPTH 31.0 TO 33.5 FEET, QU = 3.61 TSF, DRY DENSITY = 112.8 PCF, CELL PRESSURE = 1.3 TSF	569.1	31			100	ST-15	-	0	0	1	81	18	24	20	4	22	A-4b (8)	
		34	3 4 6														-4b (V)	
		39	3 4 4	12	94	SS-17	-	0	0	1	75	24	24	20	4	27	A-4b (8)	
		44	2 2 2	6	100	SS-18	-	-	-	-	-	-	-	-	-	22	A-4b (V)	
		49	2 3 3	9	94	SS-19	0.50	0	0	0	63	37	26	19	7	22	A-4b (8)	
	548.6																	
MEDIUM STIFF, GRAY, **SILT AND CLAY**, TRACE SAND, TRACE GRAVEL, MOIST		54	4 5 5	15	100	SS-20	0.50	-	-	-	-	-	-	-	-	28	A-6a (V)	
	542.9																	
STIFF, GRAY, **SILT AND CLAY**, MOIST																		

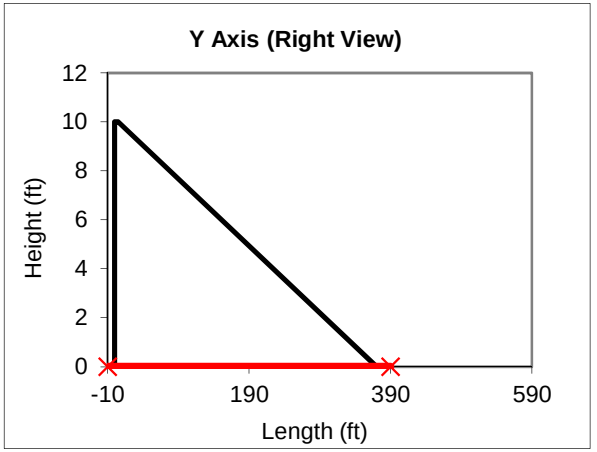
Soil layer 5
unit weight - 130pcf
average N60 - 10
Su - 1,900psf
LL- 25
PI - 5

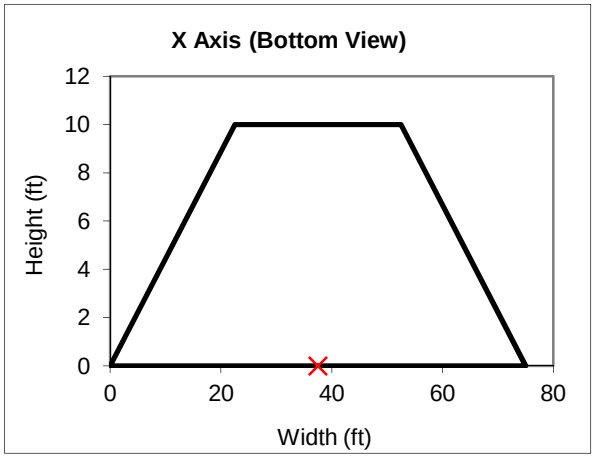
Embankment or Footing Geometry

Bottom of Embankment	Width (ft)	75
	Length (ft)	370.5
Top of Embankment	Width (ft)	30
	Length (ft)	5
Horizontal Distance Between Top & Bottom		
Offset	Width (ft)	22.5
	Length (ft)	0
Height of Embankment (ft)		10
Unit Weight of Embankment (pcf)		126
Line Where Settlement Will Be Calculated		
Pick the start and stop points using plan view.	X_1 =	37.5
	Y_1 =	-10
	X_2 =	37.5
	Y_2 =	390
Number of Settlement Points		25
Thickness of Horizontal Slice (ft)		1

Click to Calculate Settlement







Stress Distribution Method

- (●) Boussinesq Stress Distribution
- ( ) Westergaard Stress Distribution

Project Information

Project:	Old Rockside Road Bridge 00.42
Location:	Cuyahoga County, Ohio
Number:	N6175053
Date:	5/25/2021

Soil Profile and Groundwater

Depth to Groundwater (ft)	0.0

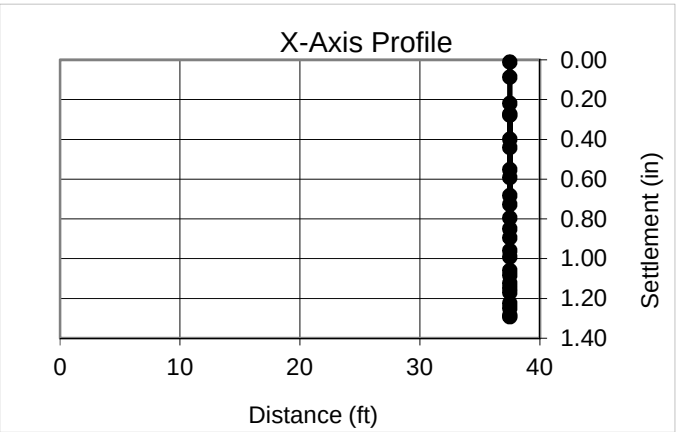
Top (ft)	Bottom (ft)	γ_{moist} (pcf)	C_{eC}	C_{eR}	OCR	Layers
0	8	105	0.082	0.000	80.1	5.0
8	13	120	0.020	0.020	1.0	5.0
13	18	125	0.082	0.013	12.7	5.0
18	31	135	0.078	0.008	6.1	5.0
31	51	130	0.061	0.001	5.8	5.0

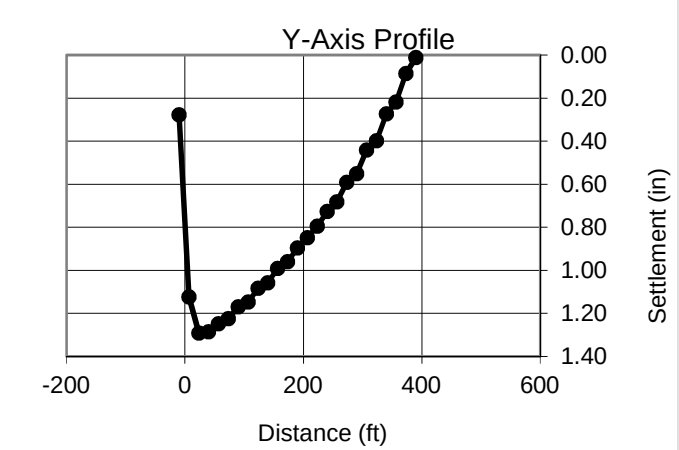
Project:	Old Rockside Road Bridge 00.4	Cuyahoga County, Oh	N6175053	5/25/2021

Summary of Calculated Settlement

X (ft)	Y (ft)	Settlement (in)
37.5	-10.0	0.3
37.5	6.7	1.1
37.5	23.3	1.3
37.5	40.0	1.3
37.5	56.7	1.2
37.5	73.3	1.2
37.5	90.0	1.2
37.5	106.7	1.1
37.5	123.3	1.1
37.5	140.0	1.1
37.5	156.7	1.0
37.5	173.3	1.0
37.5	190.0	0.9
37.5	206.7	0.8
37.5	223.3	0.8
37.5	240.0	0.7
37.5	256.7	0.7
37.5	273.3	0.6
37.5	290.0	0.6
37.5	306.7	0.4
37.5	323.3	0.4
37.5	340.0	0.3
37.5	356.7	0.2
37.5	373.3	0.1
37.5	390.0	0.0

Project:	Old Rockside Road Bridge 00.42
Location:	Cuyahoga County, Ohio
Number:	N6175053
Date:	5/25/2021
Method:	Boussinesq





Stress and Settlement Calculation Output

Project: Old Rockside Road Bridge 00.42 | Location: Cuyahoga County, Ohio
Number: N8175053 | Date: 5/25/2021

X	Y	Mid Point Depth (ft)	σ_o' (psf)	σ_p' (psf)	$\Delta\sigma'$ (psf)	σ_f' (psf)	Settlement (in)	
37.5	23.33333	0.8	34	2730	1260	1294	0.012	
37.5	23.33333	2.4	102	8189	1259	1361	0.009	
37.5	23.33333	4	170	13649	1256	1427	0.007	
37.5	23.33333	5.6	239	19109	1251	1489	0.006	
37.5	23.33333	7.2	307	24568	1241	1548	0.005	0.039
37.5	23.33333	8.5	370	370	1230	1600	0.153	
37.5	23.33333	9.5	427	427	1220	1647	0.141	
37.5	23.33333	10.5	485	485	1209	1693	0.130	
37.5	23.33333	11.5	542	542	1196	1738	0.121	
37.5	23.33333	12.5	600	600	1181	1781	0.113	0.659
37.5	23.33333	13.5	660	8383	1166	1826	0.071	
37.5	23.33333	14.5	723	9178	1149	1872	0.066	
37.5	23.33333	15.5	785	9973	1131	1917	0.062	
37.5	23.33333	16.5	848	10768	1113	1961	0.058	
37.5	23.33333	17.5	911	11563	1094	2005	0.055	0.311
37.5	23.33333	19.3	1036	6321	1059	2095	0.072	
37.5	23.33333	21.9	1225	7472	1006	2231	0.061	
37.5	23.33333	24.5	1414	8624	954	2368	0.052	
37.5	23.33333	27.1	1602	9775	902	2505	0.045	
37.5	23.33333	29.7	1791	10926	853	2644	0.040	0.270
37.5	23.33333	33	2021	11721	793	2814	0.003	
37.5	23.33333	37	2291	13289	727	3018	0.003	
37.5	23.33333	41	2562	14857	668	3229	0.002	
37.5	23.33333	45	2832	16426	615	3447	0.002	
37.5	23.33333	49	3102	17994	567	3669	0.002	0.013
					Boussinesq	Total=	1.3	

EXAMPLE CALCULATION - MID POINT DEPTH @ 4'

LAYER 1 THICKNESS = 8' SLICE THICKNESS = 8'/5 = 1.6' = 19.2"

$$S = H C_{cr} \log \frac{\sigma_f'}{\sigma_o'}$$

$$= 19.2\text{ in} \, (0.0004) \log \frac{1427\text{ psf}}{170\text{ psf}}$$

$$= 0.007\text{ in}$$

EMBANKMENT SETTLEMENT PARAMETERS

GROUNDWATER TABLE – ASSUME DEPTH = 0 FEET

UNIT WEIGHTS

LAYER 1	0-8'	$\bar{N}_{60}$ = 4	γ = 105 pcf	FROM ODOT GB-7 TABLE 1
LAYER 2	8-13'	$\bar{N}_{60}$ = 7	γ = 120 pcf	
LAYER 3	13-18'	$\bar{N}_{60}$ = 12	γ = 125 pcf	
LAYER 4	18-31'	$\bar{N}_{60}$ = 14	γ = 135 pcf	
LAYER 5	31-51'	$\bar{N}_{60}$ = 10	γ = 130 pcf	

PRECONSOLIDATION PRESSURE

$$\sigma_p' = S_u / (0.11 + 0.0037\,PI)$$

NAVFAC DM 7.1 CHAP 3 SECT 4 SUBSECT 3.6

COHESIVE SOIL LAYERS 1, 3, 4, 5

S_u LAYER 1 – 1,750 psf (HAND PEN RESULTS)
LAYER 3 – 1,685 psf (HAND PEN RESULTS)
LAYER 4 – 1,300 psf (HAND PEN RESULTS)
LAYER 5 – 1,900 psf (HAND PEN & UU TESTS)

PI LAYER 1 – 5
LAYER 3 – 16
LAYER 4 – 11
LAYER 5 – 5

σ_p'

LAYER 1 = 1,750 psf / (0.11 + 0.0037(5)) = 13,619 psf

LAYER 3 = 1,685 psf / (0.11 + 0.0037(16)) = 9,959 psf

LAYER 4 = 1,300 psf / (0.11 + 0.0037(11)) = 8,624 psf

LAYER 5 = 1,900 psf / (0.11 + 0.0037(5)) = 14,786 psf

σ_v'

LAYER 1 = (105 pcf - 62.4 pcf)(4') = 170 psf

LAYER 3 = (105 pcf - 62.4 pcf)(8') + (120 pcf - 62.4 pcf)(5') + (125 pcf - 62.4 pcf)(2.5') = 785 psf

LAYER 4 = (105 pcf - 62.4 pcf)(8') + (120 pcf - 62.4 pcf)(5') + (125 pcf - 62.4 pcf)(5') + (135 pcf - 62.4 pcf)(6.5') = 1,414 psf

LAYER 5 = (105 pcf - 62.4 pcf)(8') + (120 pcf - 62.4 pcf)(5') + (125 pcf - 62.4 pcf)(5') + (135 pcf - 62.4 pcf)(13') + (130 pcf - 62.4 pcf)(10') = 2,562 psf

OCR = σ_p'/σ_v'

LAYER 1 = 13,619 psf / 170 psf = 80.1

LAYER 3 = 9,959 psf / 785 psf = 12.7

LAYER 4 = 8,624 psf / 1,414 psf = 6.1

LAYER 5 = 14,786 psf / 2,562 psf = 5.8

$C_{ec} = C_c / (1+e_o)$

e_o - INTERPOLATED FROM TRENDLINE PLOT OF ATLANTIC LABORATORY TEST RESULTS

LAYER 1 - 0.68

LAYER 3 - 0.66

LAYER 4 - 0.65

LAYER 5 - 0.58

$C_c = -0.156 + 0.411 e_o + 0.00058 LL$ FROM AL-KHAFAJI & ANDERSON (1992)

LL

LAYER 1 - 25

LAYER 3 - 37

LAYER 4 - 31

LAYER 5 - 25

C_c

LAYER 1 = $-0.156 + 0.411(0.68) + 0.00058(25) = 0.1380$

LAYER 3 = $-0.156 + 0.411(0.66) + 0.00058(37) = 0.1367$

LAYER 4 = $-0.156 + 0.411(0.65) + 0.00058(31) = 0.1291$

LAYER 5 = $-0.156 + 0.411(0.58) + 0.00058(25) = 0.0969$

C_{ec}

LAYER 1 = $0.1380 / (1+0.68) = 0.0821$

LAYER 3 = $0.1367 / (1+0.66) = 0.0823$

LAYER 4 = $0.1291 / (1+0.65) = 0.0782$

LAYER 5 = $0.0969 / (1+0.58) = 0.0613$

$C_{cr} = C_r / (1+e_0)$

$C_r = 0.00194 (PI - 4.6)$ NAKASE (1988)

Layer 1 – $0.00194 (5 - 4.6) = 0.0008$

Layer 3 – $0.00194 (16 - 4.6) = 0.0221$

Layer 4 – $0.00194 (11 - 4.6) = 0.0124$

Layer 5 – $0.00194 (5 - 4.6) = 0.0008$

C_{cr}

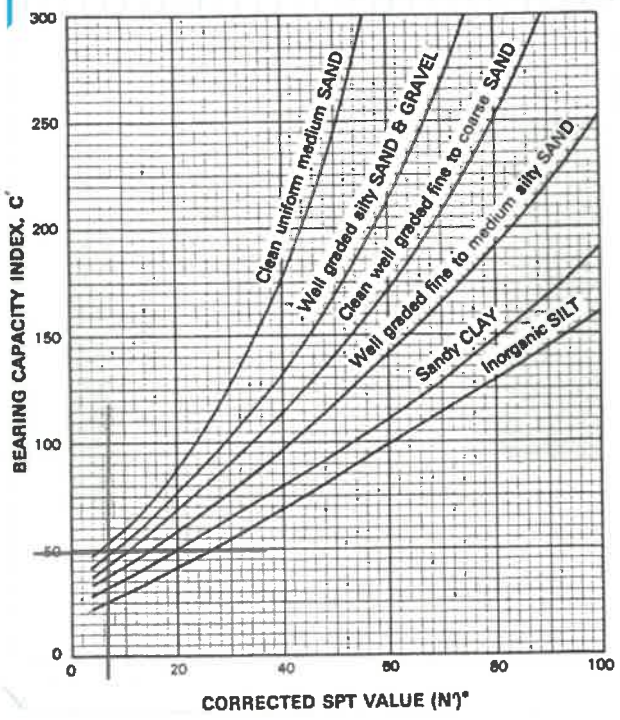
Layer 1 – $0.0008 / (1 + 0.68) = 0.0004$

Layer 3 – $0.0221 / (1 + 0.66) = 0.0133$

Layer 4 – $0.0124 / (1 + 0.65) = 0.0075$

Layer 5 – $0.0008 / (1 + 0.58) = 0.0005$

FOR LAYER 2 $C_{cc} = 1/C'$ WHERE C' IS TAKEN FROM THE FOLLOWING TABLE AND $C_{cr} \approx C_{cc}$ AS RECOMPRESSION ≈ COMPRESSION



FOR WELL GRADED SAND & GRAVEL & $\bar{N}_{60} \approx 7$

$C' \approx 50$

$C_{cc} = 1/C' = 1/50 = 0.020$

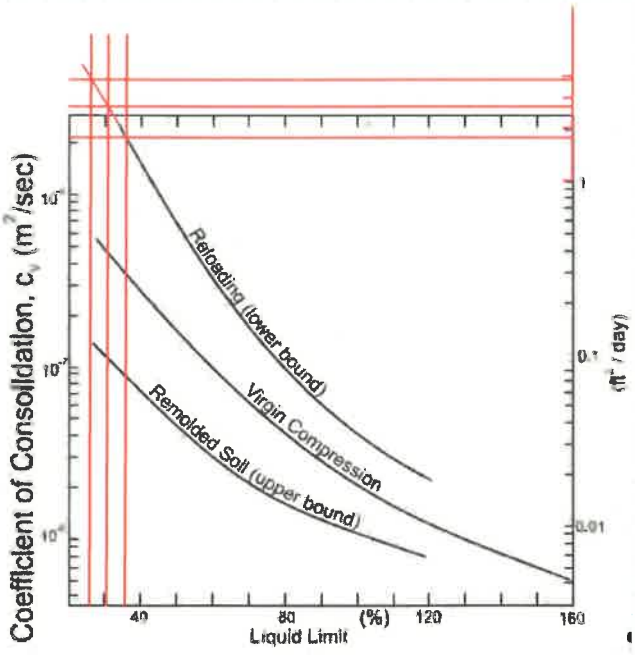
FHWA-SA-02-054 pp. 89-91

TIME RATE OF SETTLEMENT ANALYSIS

DRAINAGE PATH - TAKE ½ THE THICKNESS OF EACH COHESIVE LAYER AS THE DRAINAGE PATH, I.E.

LAYER 1 - H = 4'
LAYER 3 - H = 2.5'
LAYER 4 - H = 6.5'
LAYER 5 - H = 10'

COEFFICIENT OF CONSOLIDATION, C_v - ESTIMATE FROM SECTION 6.14.2 OF THE 2016 FHWA GEC 5 BASED ON LIQUID LIMIT



LAYER 1 LL = 25 C_v = 3.7 ft^2/day

LAYER 3 LL = 37 C_v = 1.8 ft^2/day

LAYER 4 LL = 31 C_v = 2.6 ft^2/day

LAYER 5 LL = 25 C_v = 3.7 ft^2/day

TAKE THE EQUATION $t = \frac{TH^2}{C_v}$ WHERE $T = 1.781 - 0.933 \log(100 - U)$ AND

REARRANGING TO SOLVE FOR U AT A GIVEN t: $U = 100 - 10^{\frac{1.781 - \left(\frac{tC_v}{H^2}\right)}{0.933}}$

From the settlement analysis, total anticipated settlement within each layer

Layer 1 - 0.039"

Layer 2 - 0.659"

Layer 3 - 0.311"

Layer 4 - 0.270"

Layer 5 - 0.013"

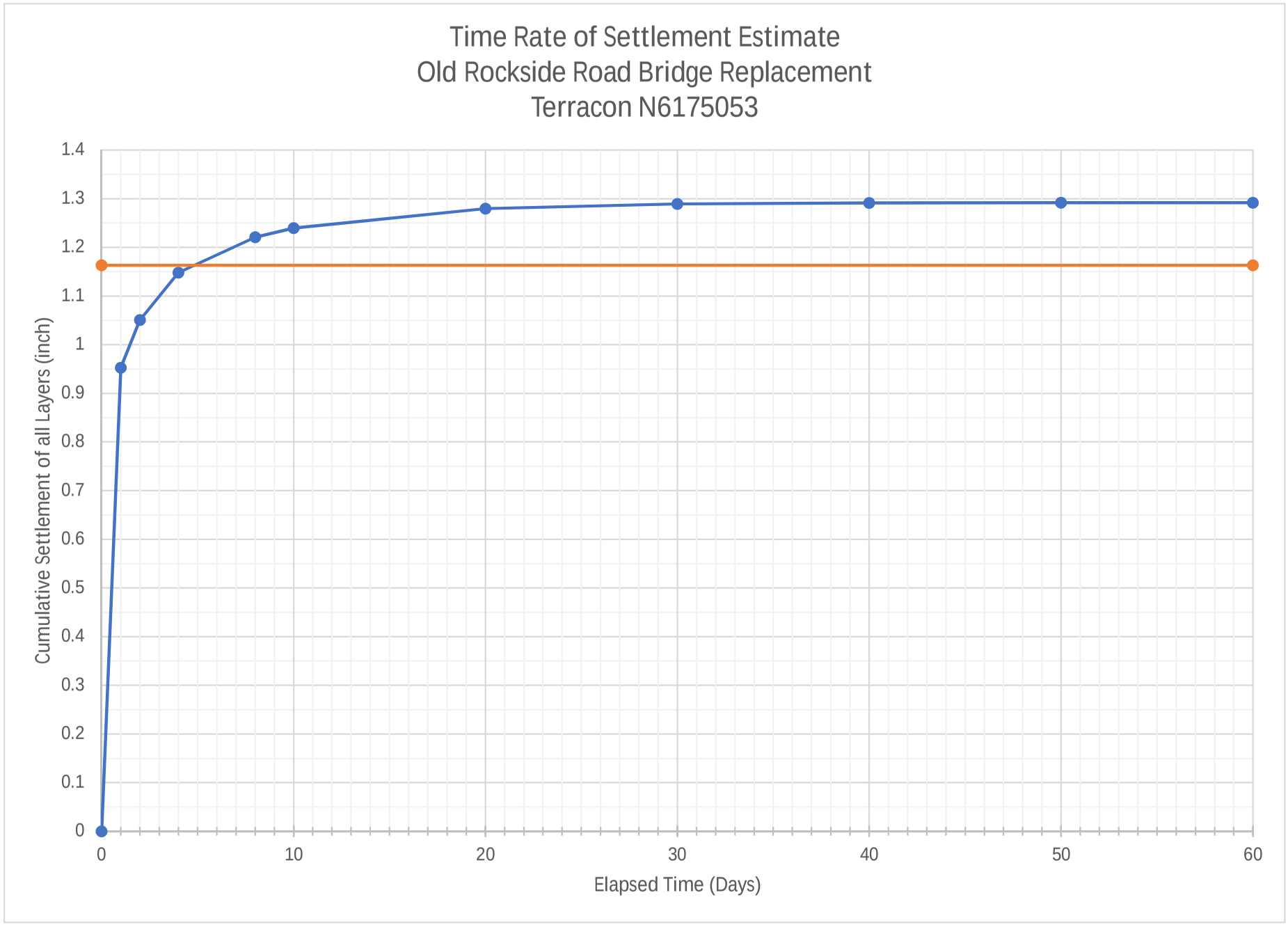
Because layer 2 is granular, assume settlement to be immediate, for remaining layers, find the degree of consolidation, and resulting consolidation settlement for given duration, t.

Example: Layer 1, t = 1 day

$$U = 100 - 10^{\frac{1.781 - \left(\frac{1\,day * 3.7\,ft^2/day}{(4ft)^2}\right)}{0.933}} = 54.2\%$$

Settlement of the layer @ 1 day $S_1 = 0.039" \times 0.542 = 0.021"$

Summing the incremental settlement within each layer, and including the full value from layer 2, consolidation can be plotted against time. See the attached plot which incurs a target of 90% consolidation of the entire mass (i.e. 90% of 1.292" or 1.16"). From this plot, it is estimated that 90% consolidation will occur approximately 5 days after placement.


Time Rate of Settlement Estimate
Old Rockside Road Bridge Replacement
Terracon N6175053
Cumulative Settlement of all Layers (inch)
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
50
60
Elapsed Time (Days)

GEOTECHNICAL BULLETIN GB-1

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

CUY-OLD ROCKSIDE ROAD
91563

CUY-OLD ROCKSIDE ROAD BRIDGE REPLACEMENT

Terracon Consultants, Inc.

Prepared By: Russ Gatermann
Date prepared: Friday, August 21, 2020

Lynton L. Price
12460 Plaza Drive
Parma, Ohio

(216) 539-4214
lynton.price@terracon.com

NO. OF BORINGS: 2

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-19	CENTERLINE	29+64	10	RT	Mobile B-57	94	600.9	602.3	1.4 F
2	B-005-0-19	CENTERLINE	34+12	8	LT	Mobile B-57	94	603.5	602.6	0.9 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B 001-0 19	SS-1	2.0	3.5	3.4	4.9	6		1.75	28	17	11	48	27	75	21	14	A-6a	8	170					
		SS-2	3.5	5.0	4.9	6.4	5		0.75							28	10	A-4a	8						
		SS-3	5.0	6.5	6.4	7.9	3		1	24	18	6	43	18	61	26	13	A-4a							
		SS-4	6.5	8.0	7.9	9.4	3	5	0.75							33	10	A-4a							
2	B 005-0 19	SS-1	2.0	3.5	1.1	2.6	62			NP	NP	NP	21	10	31	11	10	A-2-4	0	2770					
		SS-2	3.5	5.0	2.6	4.1	9		2.5	27	19	8	51	21	72	16	14	A-4b	7						
		SS-3	5.0	6.5	4.1	5.6	6		1	25	18	7	52	18	70	24	13	A-4b	7						
		SS-4	6.5	8.0	5.6	7.1	5	5	1							32	10	A-4b							

PID: 91563

County-Route-Section: CUY-OLD ROCKSIDE ROAD

No. of Borings: 2

Geotechnical Consultant: Terracon Consultants, Inc.

Prepared By: Russ Gatermann

Date prepared: 8/21/2020

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	Option
	Lime Stabilization	No
206	Depth	14''

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	21''
Average(HP):	12''
Global Geogrid Average(N60L):	15''
Average(HP):	0''

Design CBR	7

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	33%	HP ≤ 0.5	0%
$N_{60} < 12$	83%	0.5 < HP ≤ 1	50%
$12 \leq N_{60} < 15$	0%	1 < HP ≤ 2	17%
$N_{60} \geq 20$	17%	HP > 2	17%
M+	0%		
Rock	0%		
Unsuitable	38%		

Excavate and Replace at Surface	
Average	0''
Maximum	0''
Minimum	0''

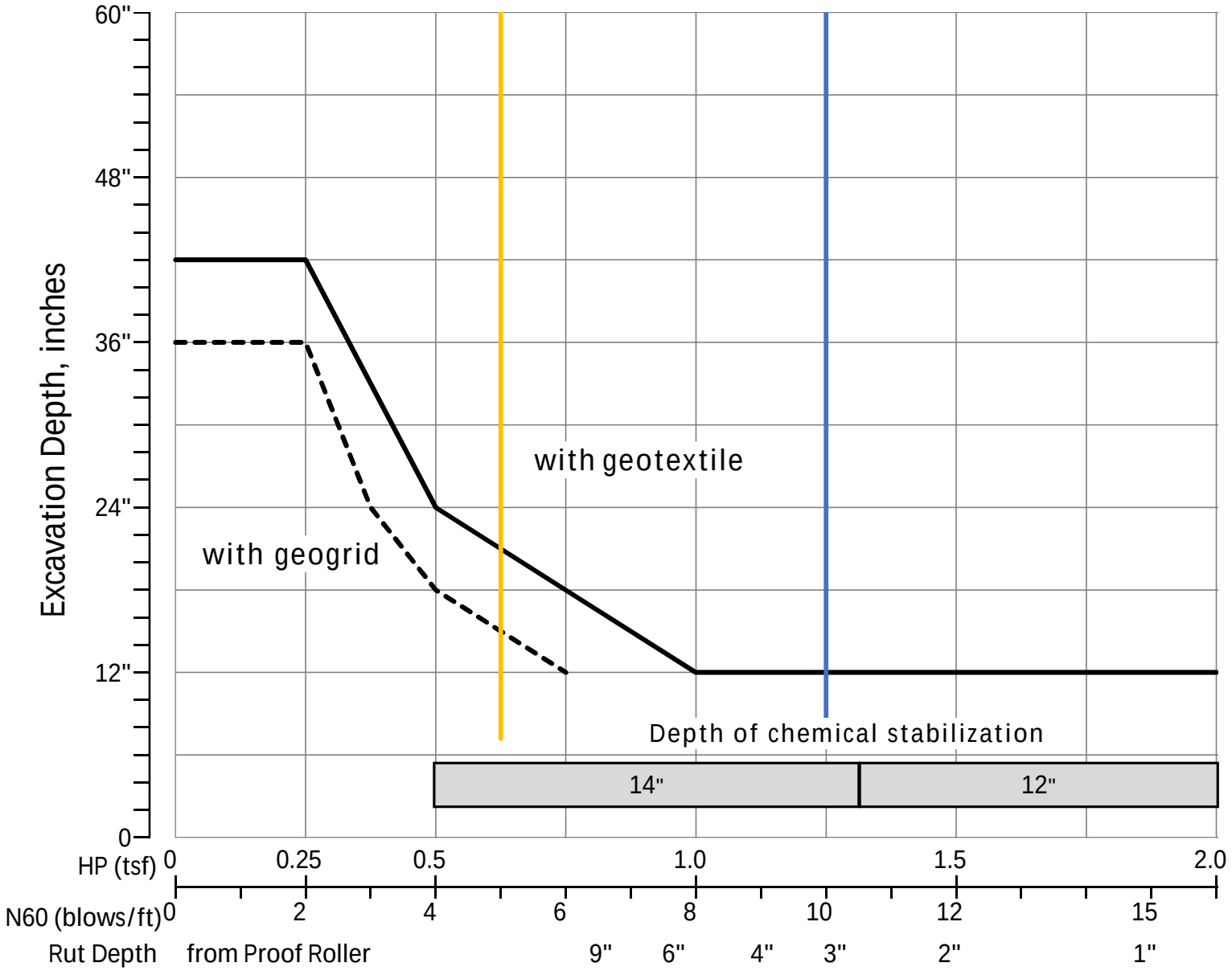
% Proposed Subgrade Surface	
Unstable & Unsuitable	0%
Unstable	0%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	12	5	1.25	26	18	8	43	19	62	24	12	6
Maximum	62	5	2.50	28	19	11	52	27	75	33	14	8
Minimum	3	5	0.75	24	17	6	21	10	31	11	10	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	0	0	1	0	0	0	0	0	3	3	0	1	0	0	0	0	0	8
Percent	0%	0%	0%	13%	0%	0%	0%	0%	0%	38%	38%	0%	13%	0%	0%	0%	0%	0%	100%
% Rock|Granular|Cohesive	0%	50%									50%								100%
Surface Class Count	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
Surface Class Percent	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
1.25		☐ HP
5.00		☐ N60L

Average HP
Average N_{60L}

ASBESTOS INSPECTION REPORT,
INCLUDING OHIO ENVIRONMENTAL PROTECTION AGENCY
NOTICE OF DEMOLITION AND RENOVATION

Lawhon & Associates, Inc.
ENVIRONMENTAL CONSULTING AND ENGINEERING SERVICES

Columbus
Cleveland
Dayton

June 17, 2019

Jeff Ackerman, PE
Burgess & Niple, Inc.
100 W Erie Street
Painesville, Ohio 44077
440-354-9700

Subject: **Asbestos Inspection of the Old Rockside Road Bridge over the Cuyahoga River (SFN 1876082/PID 91563) in Valley View, Ohio 44125 (L&A 19-0201)**

Dear Mr. Ackerman:

On June 6, 2019, Mr. Matthew Geiger, Ohio Environmental Protection Agency (EPA) Certified Asbestos Hazard Evaluation Specialist (AHES OH #35832) of Lawhon & Associates, Inc. (L&A) conducted an asbestos survey of the Old Rockside Road Bridge over the Cuyahoga River (SFN 1876082/PID 91563) in Valley View, Ohio 44125. The purpose of the survey was to determine the presence of asbestos-containing materials (ACM) located on the structure.

The survey consisted of an inspection of all accessible areas of the bridge to determine the presence, location and quantities of asbestos-containing materials. Bulk samples were collected from suspect materials that could potentially be impacted during demolition/renovation work activities. A diagram of the bridge and asbestos bulk sampling locations can be found in **Appendix B**. All available bridge plans were reviewed for this bridge and no asbestos containing materials were listed.

Suspect Materials

The materials suspected of being asbestos-containing identified during the survey are presented in Table 1, along with an indication of their friability.

Table 1: Suspected Materials

Material	Locations	Friability
Bridge Paint	Above Deck – Railings	Non Friable
Stone Mortar	Below Deck – Abutments	Non Friable
West Abutment Cloth	Below Deck – West Abutment	Non Friable
Black Caulking	Above Deck – Locked Box, North End Middle	Non Friable

Sample Descriptions, Locations and Results

Sample descriptions, locations, and asbestos content as determined by Polarized Light Microscopy (PLM) are presented in Table 2.

Table 2: Sample Descriptions, Locations and Results

Sample #	Sample Description and Location	Asbestos %
1	Bridge Paint – South Side, East End Railing	No Asbestos Detected
2	Bridge Paint – North Side, East End Railing	No Asbestos Detected
3	Bridge Paint – North Side, West End Railing	No Asbestos Detected
4	Stone Mortar – North Side, West End Below Deck	No Asbestos Detected
5	Stone Mortar – Middle, West End Below Deck	No Asbestos Detected
6	Stone Mortar – North Side, East End Below Deck	No Asbestos Detected
7	West Abutment Cloth – West Abutment	No Asbestos Detected
8	West Abutment Cloth – West Abutment	No Asbestos Detected
9	West Abutment Cloth – West Abutment	No Asbestos Detected
10	Black Caulking – North End Middle	No Asbestos Detected
11	Black Caulking – North End Middle	No Asbestos Detected
12	Black Caulking – North End Middle	No Asbestos Detected

Materials Identified as Asbestos-Containing

Under the current EPA/NESHAP regulations, materials that contain greater than 1% asbestos are considered to be an asbestos-containing material (ACM). None of the materials sampled were found to be Asbestos Containing Material as defined by U.S. EPA/NESHAP regulations.

Materials Assumed as Asbestos-Containing

There were two locked boxes located on the North side of the bridge. Due to limited access and potentially energized electrical components L&A assumes that there may be energized electrical components within the boxes that were not included as part of this assessment. These materials should be assumed to contain asbestos, until further testing determines otherwise. An Image depicting the electrical boxes can be found in **Figure 8** of **Appendix B**.

The following is a list of materials assumed to contain asbestos because sampling could not be conducted at the time of assessment:

Table 3: Assumed Asbestos Containing Materials

Material	Location	Quantity
Electrical Components (1)	Locked Boxes North Side of Bridge	5 square feet

Notes: (1) Category II Non-Friable

Attachments

Appendix A contains the Ohio Environmental Protection Agency certifications for Mr. Matt Geiger.

Appendix B contains the Bulk Sample Diagram.

Appendix C contains the laboratory results and chain-of-custody documentation for the asbestos bulk samples collected.

Appendix D contains the Ohio Environmental Protection Agency Notification of Demolition and Renovation.

Summary

On June 6, 2019 Mr. Matt Geiger, (EPA) Certified Asbestos Hazard Evaluation Specialist (AHES OH #35832) of Lawhon & Associates, Inc. (L&A) conducted an asbestos survey of the Old Rockside Road Bridge over the Cuyahoga River (SFN 1876082/PID 91563) in Valley View, Ohio 44125. Asbestos-containing materials were assumed as part of this survey, because sampling could not be conducted at the time of assessment. Any contractors disturbing these materials must adhere to OSHA 29 CFR 1910 and 29 CFR 1926. If you have any questions, please contact Jordan Mederer at (614) 481-8600.

Sincerely,

Matt Geiger, AHES 35832
Project Manager

Jordan Mederer, AHES 35005
HBM Department Manager

APPENDIX A
OHIO ENVIRONMENTAL PROTECTION AGENCY CERTIFICATIONS

The InService Training Network

Asbestos Building Inspector and Management Planner
Refresher Courses



Matthew Geiger

has successfully completed the Asbestos Building Inspector and Management Planner Refresher Courses and passed by at least 70% the course examinations for accreditation under Section 206 of the Toxic Substance Control Act, Title II, and Indiana 326 IAC 18-2
Provided by: The InService Training Network, Inc., 6813 Flags Center, Columbus, OH 43229 (614) 895-9323

Course Dates: **July 18, 2018**

Course Director: Kurt Varga

Expiration Date: **July 18, 2019**

Examination Date: **July 18, 2018**

Course Location: **Columbus, Ohio**

Certificate Numbers: **ITNIR-6434 & ITNMPR-6434**

Ohio Environmental Protection Agency

John R. Kasich, Governor
Mary Taylor, Lt. Governor
Craig W. Butler, Director

September 05, 2018

Matthew A Geiger
Lawhon & Associates, Inc
1441 King Ave
Columbus OH 43212

RE: Asbestos Hazard Evaluation Specialist
Certification Number: ES35832
Expiration Date: 10/14/2019

Dear Matthew A Geiger:

This letter and enclosed certification card approves your request to be certified as an Asbestos Hazard Evaluation Specialist. You must present your card upon request at any project site while performing duties. Copies of cards are not acceptable as proof of certification.

This certification may be revoked by the Director of the Environmental Protection Agency for violation of any of the requirements of 3745-22 or 3745-20 of the Ohio Administrative Code.

If you have any questions, please call 614-644-0226.

Sincerely,

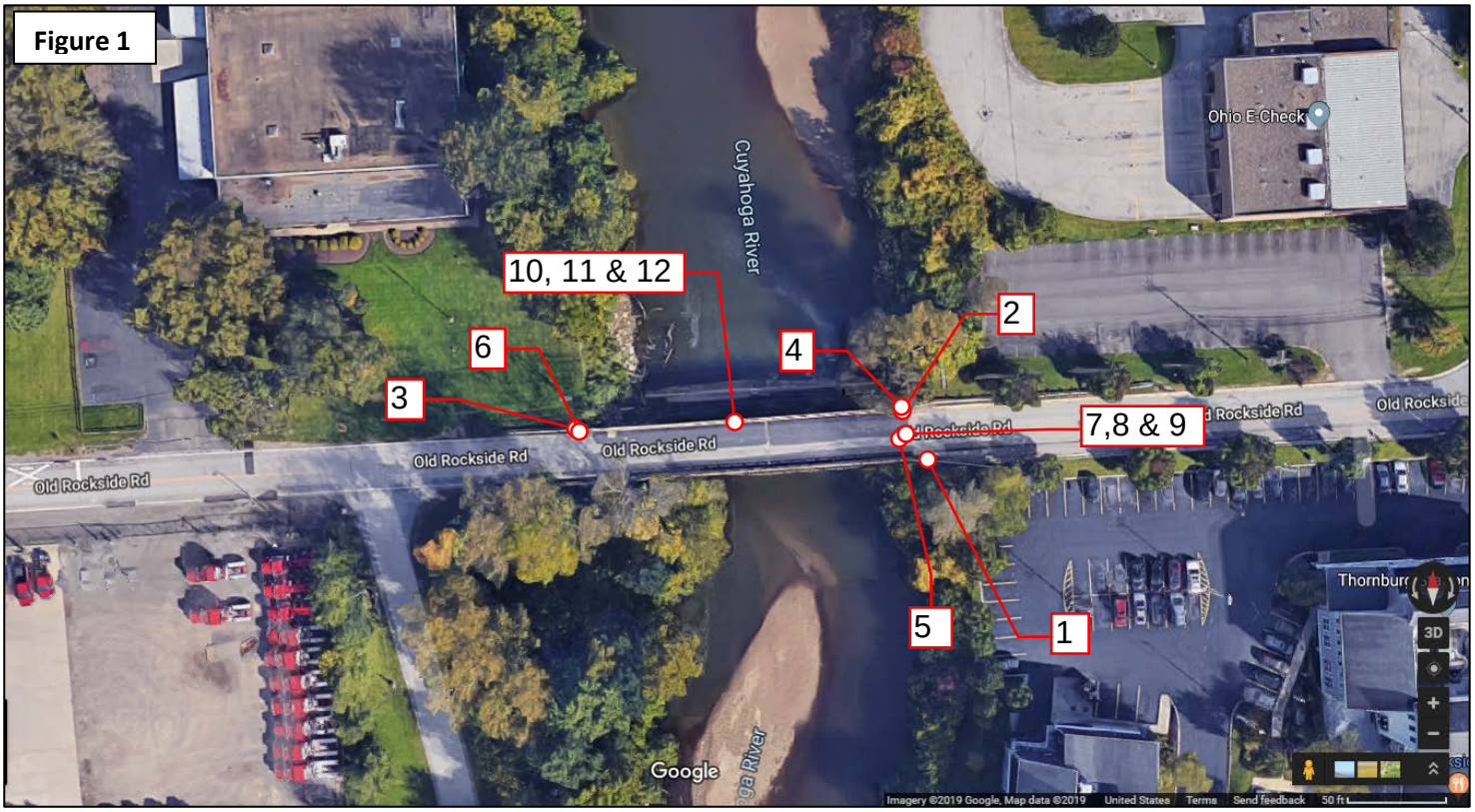
Mark Needham
Manager, Asbestos Program
Division of Air Pollution Control



50 West Town Street • Suite 700 • P.O. Box 1049 • Columbus, OH 43216-1049
epa.ohio.gov • (614) 644-3020 • (614) 644-3184 (fax)

APPENDIX B
BULK SAMPLE DIAGRAM

Figure 1



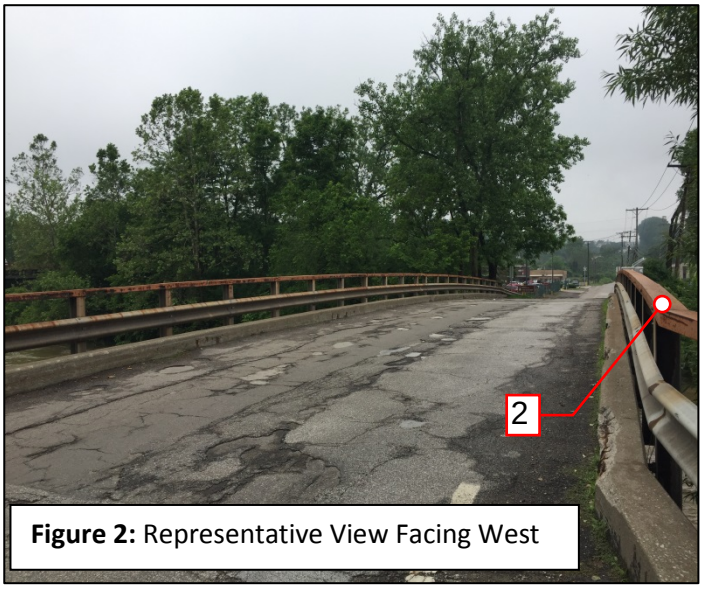


Figure 2: Representative View Facing West

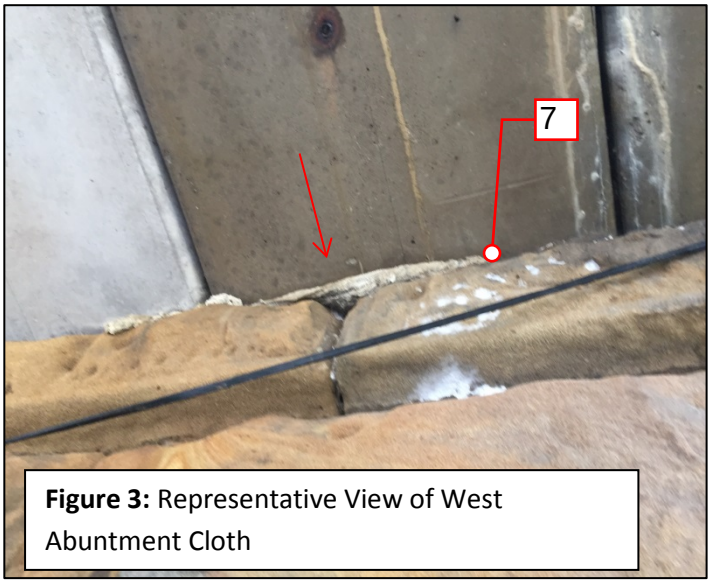


Figure 3: Representative View of West Abuntment Cloth



Figure 4: Representative View of Mortar

Lawhon & Associates, Inc.
ENVIRONMENTAL CONSULTING AND ENGINEERING SERVICES

Columbus
Cleveland
Dayton

Bulk Sample Diagram

Inventory Bridge Number: CUY ORRCP 0042
Structure File Number: 1876082
Date Sampled: June 6, 2019
Surveyors: Matt Geiger, AHES 35832

Signature: Matt K Geiger

1441 King Avenue | Columbus, Ohio 43212 | P: 614.481.8600 | F: 614.481.8610 | www.lawhon-assoc.com



Figure 5: Representative View Below Deck of Old Rockside Road Bridge Over Cuyahoga River Facing North East

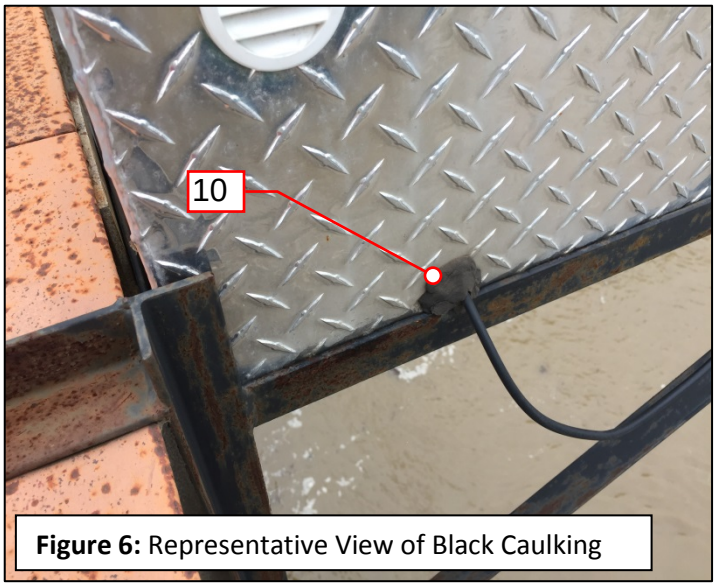


Figure 6: Representative View of Black Caulking

Figure 7: Representative View Below Deck of Old Rockside Road Bridge Over Cuyahoga River Facing East





Figure 8: Representative View Locked Boxes

Lawhon & Associates, Inc.
ENVIRONMENTAL CONSULTING AND ENGINEERING SERVICES

Columbus
Cleveland
Dayton

Bulk Sample Diagram

Inventory Bridge Number: CUY ORRCP 0042
Structure File Number: 1876082
Date Sampled: June 6, 2019
Surveyors: Matt Geiger, AHES 35832

Signature: Matt K Geiger

1441 King Avenue | Columbus, Ohio 43212 | P: 614.481.8600 | F: 614.481.8610 | www.lawhon-assoc.com

APPENDIX C
LABORATORY RESULTS AND CHAIN OF CUSTODY

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Lawhon & Associates Inc.
1441 King Avenue
Columbus OH 43212

Client: LAW411

Report Date: 6/13/2019
Report No.: 591974 - PLM
Project: CUY - ORRCP - 0042
Project No.: 19-0201

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 6805991 **Analyst Observation:** Red Paint **Location:** South Side East End
Client No.: 1 **Client Description:** Bridge Paint **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Lab No.: 6805992 **Analyst Observation:** Red Paint **Location:** North Side East End
Client No.: 2 **Client Description:** Bridge Paint **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Lab No.: 6805993 **Analyst Observation:** Red Paint **Location:** North Side West End
Client No.: 3 **Client Description:** Bridge Paint **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Lab No.: 6805994 **Analyst Observation:** Grey Mortar **Location:** West End Below Deck North
Client No.: 4 **Client Description:** Stone Mortar **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Lab No.: 6805995 **Analyst Observation:** Grey Mortar **Location:** West End Below Deck Middle
Client No.: 5 **Client Description:** Stone Mortar **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Lab No.: 6805996 **Analyst Observation:** Grey Mortar **Location:** East End Below Deck North
Client No.: 6 **Client Description:** Stone Mortar **Facility:**

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: None Detected
Percent Non-Fibrous Material: 100

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 6/7/2019
Date Analyzed: 06/13/2019
Signature:
Analyst: Erik Swanson

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Lawhon & Associates Inc.
1441 King Avenue
Columbus OH 43212

Client: LAW411

Report Date: 6/13/2019
Report No.: 591974 - PLM
Project: CUY - ORRCP - 0042
Project No.: 19-0201

PLM BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 6805997
Client No.: 7
Analyst Observation: Tan Wrap
Client Description: West Abutment Cloth
Location: West Abutment
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 98 Cellulose
Percent Non-Fibrous Material: 2

Lab No.: 6805998
Client No.: 8
Analyst Observation: Tan Wrap
Client Description: West Abutment Cloth
Location: West Abutment
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 98 Cellulose
Percent Non-Fibrous Material: 2

Lab No.: 6805999
Client No.: 9
Analyst Observation: Tan Wrap
Client Description: West Abutment Cloth
Location: West Abutment
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 98 Cellulose
Percent Non-Fibrous Material: 2

Lab No.: 6806000
Client No.: 10
Analyst Observation: Black Caulk
Client Description: Black Caulking
Location: North End Middle
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 15 Cellulose
Percent Non-Fibrous Material: 85

Lab No.: 6806001
Client No.: 11
Analyst Observation: Black Caulk
Client Description: Black Caulking
Location: North End Middle
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 15 Cellulose
Percent Non-Fibrous Material: 85

Lab No.: 6806002
Client No.: 12
Analyst Observation: Black Caulk
Client Description: Black Caulking
Location: North End Middle
Facility:

Percent Asbestos: *None Detected*
Percent Non-Asbestos Fibrous Material: 15 Cellulose
Percent Non-Fibrous Material: 85

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 6/7/2019
Date Analyzed: 06/13/2019
Signature:
Analyst: Erik Swanson

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Lawhon & Associates Inc.
1441 King Avenue
Columbus OH 43212

Client: LAW411

Report Date: 6/13/2019
Report No.: 591974 - PLM
Project: CUY - ORRCP - 0042
Project No.: 19-0201

Appendix to Analytical Report

Customer Contact:
Method: 40 CFR Appendix E to Subpart E of Part 763, interim method for the Determination of Asbestos in Bulk Insulation Samples, and USEPA 600, R93-116 as needed.

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: wchampion@iatl.com
iATL Account Representative: Shirley Clark
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Bulk Building Materials
Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and ir our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certifications:

- NIST-NVLAP No. 101165-0
- NYSDOH-ELAP No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. PC Trace represents a <0.25% amount. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Lawhon & Associates Inc.
1441 King Avenue
Columbus OH 43212

Client: LAW411

Report Date: 6/13/2019
Report No.: 591974 - PLM
Project: CUY - ORRCP - 0042
Project No.: 19-0201

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com**.

1) Note: No mastic provided for analysis.
2) Note: Insufficient mastic provided for analysis.
3) Note: Insufficient material provided for analysis.
4) Note: Insufficient sample provided for QC reanalysis.
5) Note: Different material than indicated on Sample Log / Description.
6) Note: Sample not submitted.
7) Note: Attached to asbestos containing material.
8) Note: Received wet.
9) Note: Possible surface contamination.
10) Note: Not building material. 1% threshold may not apply.
11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
12) Note: Asbestos detected but not quantifiable.
13) Note: Multiple identical samples submitted, only one analyzed.
14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.
16) Note: This sample contains >10% vermiculite mineral. See Appendix for Recommendations for Vermiculite Analysis.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gange, homogeneous exfoliated books of mica, or mixed mineral composites).Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

For New York State customers, NYSDOH requires disclaimers and qualifiers for various vermiculite containing samples that direct analysis via ELAP198.6 and ELAP198.8 for samples that contain >10% vermiculite mineral where ELAP198.6 may be used to evaluate the asbestos content of the material. However, any test result using ELAP198.6 will be reported with the following disclaimer: “ELAP198.6 method does not remove vermiculite and may underestimate the level of asbestos present in a sample containing >10% vermiculite.”

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

1)**Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116
Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.

2)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: Lawhon & Associates Inc.
1441 King Avenue
Columbus OH 43212

Client: LAW411

Report Date: 6/13/2019
Report No.: 591974 - PLM
Project: CUY - ORRCP - 0042
Project No.: 19-0201

3)**Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Floats" only.

4)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.

5)**Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.

LOQ, Limit of Quantitation estimates for mass and volume analyses.
*With advance notice and confirmation by the laboratory.
**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

Lawhon & Associates, Inc.

1441 King Avenue
Columbus, OH 43212
Phone: (614) 481-8600
Fax: (614) 481-8610

Sent To: IATL

VIA: Fed Ex

№ 1244

Page 1 of 1

Date: 6-6-19

Turn around: 5-day

ASBESTOS BULK SAMPLE CHAIN-OF-CUSTODY RECORD

Project Name:	Project No.:	Project Contact:	Sampler (print):	Signature
CUY-ORRCP-0042	19-0201	Matt Geiger		

Sample I.D. No.	Homog. Area No.	Sample /Homogeneous Area Description	Sample Location	Remarks
1	1	Bridge Paint	South Side East End	5805991
2	1	⊥	North Side East End	5805992
3	1	⊥	North Side West End	5805993
4	2	Stone Mortar	West End Below Deck North	5805994
5	2	⊥	⊥ middle	5805995
6	2	⊥	East End ⊥ North	5805996
7	3	West Abutment Cloth	West Abutment	5805997
8	3	⊥	⊥	5805998
9	3	⊥	⊥	5805999
10	4	Black Caulking	North End Middle	5806000
11	4	⊥	⊥	5806001
12	4	⊥	⊥	5806002

SAMPLE ANALYSIS BY EPA METHOD 600/R-93/116 UNLESS OTHERWISE NOTED.

☐ Stop 1st Positive ☒ Analyze All Samples

Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time	Relinquished by: (signature)	Date / Time	Received by: (signature)	Date / Time
	6-6-19 1412						

RECEIVED
JUN - 7 2019

6/13/19 OA: Vlmrh 10/13/19

Distribution: White, Lab; Yellow, File

APPENDIX D
OHIO ENVIRONMENTAL PROTECTION AGENCY
NOTICE OF DEMOLITION AND RENOVATION

Notification of Demolition and Renovation/Abatement

Section 1: General Information

Division of Air Pollution Control

Work on projects cannot begin until 10 working days after a COMPLETE original notification form, **including payment**, is submitted to Ohio EPA. Instructions and a worksheet for fee calculation are available at ***epa.ohio.gov/asbestos***. This form can be completed, and payment made, at ***ebiz.epa.ohio.gov***. Questions? ***asbestos@epa.ohio.gov*** or (614) 466-0061.

Ohio EPA Use Only	Notification #:	Postmarked: / /	Received: / /	☐ Hand-Delivered

1) Notification Information (Check all that apply)

☒ Original	☐ Revision # (count):	☐ Installation	☐ Emergency	☐ Annual	☐ Cancellation	County: Cuyahoga

2) Owner, Asbestos Abatement Contractor, Billing and Fire Department Information **Revised?** ☐

Owner		
Name: Cuyahoga County Department of Public Works		Is this a company? ☒ Yes ☐ No
Address: 2076 East Ninth Street	Contact Person:	
City: Cleveland	State: Ohio	Zip: 44115 -
Email:	Phone: (216) 348 - 3800	Fax: (216) 348 - 3896
Asbestos Abatement Contractor (if applicable)		
Name:	License #: AC	Expiration Date: / /
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -
Billing Contact		
Is this contact associated with the ☐ Owner, ☐ Asbestos Abatement Contractor, or ☐ Demolition Contractor (if not installation)?		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -
Fire Department (if applicable)		
Name:		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -

3) Ohio Asbestos Hazard Evaluation Specialist and Evaluation Procedure **Revised?** ☐

Evaluation Specialist: Matt Geiger	Certification #: ES 35832	Expiration Date: 10 / 14 / 2018

Procedure, including analytical methods, employed to detect the presence of and to estimate the quantity of regulated asbestos-containing material (RACM) and Category I and Category II non-friable asbestos-containing material: ☒ PLM ☐ Point Count ☐ TEM ☒ Other Method (Explain Below):

Visual Assessment of assumed ACM that could not be sampled at the time of the assessment.

4) Procedures to be followed should unexpected RACM be discovered (check all that apply) **Revised?** ☐

☒ Stop work and keep wet	☒ Evacuate area	☒ Demarcate area	☒ Contact licensed abatement contractor
☒ Contact district office/local air authority			
☐ Other (Explain):			

5) Planned Demolition (check all that apply) **Revised?** ☐

Describe demolition work to be performed and method(s) to be employed, including demolition techniques to be used:
☐ Implosion ☐ Fire Training ☐ Wet Methods ☐ Manual Demolition ☐ Mechanical Demolition ☐ Other (Explain):

Description of affected facility components (include attachment if necessary):

Mail completed form and payment to:
Ohio EPA, DAPC – Asbestos
50 W. Town St., 7th Floor or P.O. Box 1049
Columbus, OH 43216-1049

Notification of Demolition and Renovation/Abatement

Section 1: General Information

Continued

6) Asbestos Description and Engineering Controls (if asbestos is being abated) **Revised?** ☐

For the material listed in each project, describe the type(s) of ACM to be abated, engineering controls and work practices to be used to minimize emissions and ensure proper waste handling:					
Type of ACM to be abated:	☐ Surfacing	☐ Mechanical	☐ Other		
Engineering Controls:	☐ Wet Methods	☐ Glove Bag	☐ NPE	☐ AFD	☐ Other:
Work Practices:	☐ Intact Removal	☐ Manual	☐ Mechanical	☐ Other:	

7) Asbestos Waste Transporter (if applicable) **Revised?** ☐

Transporter #1 Name:		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -
Transporter #2 Name (if applicable):		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -

8) Asbestos Waste Disposal Site (if applicable) **Revised?** ☐

Name:		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -

9) Emergency Demolition (complete if you checked "Emergency" above and "Demolition" for any project) **Revised?** ☐

A copy of the issued order, including the following information, **must be attached** to this notification.	
Government Official Issuing Order:	Title:
Agency:	Authority of Order (Citation of Code):
Date of Order: / /	Demolition Date: / /

10) Emergency Renovation/Abatement (complete if you checked "Emergency" above and "Renovation/Abatement" for any project) **Revised?** ☐

Date of Emergency: / /	Time of Emergency: : ☐ a.m. ☐ p.m.
Description of Sudden, Unexpected Event:	
Explanation of how the event caused unsafe conditions or equipment damage:	

11) Attestation **Revised?** ☐

In accordance with Ohio Administrative Code rule 3745-20-03(A)(4)(p), I certify that at least one person trained as required by paragraph (B) of rule 3745-20-04 of the Administrative Code will supervise the stripping and removal described by this notification. I acknowledge that the submission of false or misleading statements is prohibited by law and I certify that facts contained in this notification are true, accurate, and complete.	
Signature:	Date: / /
Name:	Title:
Organization:	

Notification of Demolition and Renovation/Abatement

Section 2: Project Address Specific Information

Division of Air Pollution Control

Please complete Section 2 for the address included with this notification. If the project is an "Installation" per OAC 3745-20, complete a separate Section 2 page for each address associated with this notification.

Ohio EPA Use Only	Project ID #:

A. Facility Description **Revised?** ☐

Building Name (if applicable): CUY ORRCP 0042	Site Location (specific): 800 Ft West Canal Road	
Address: 41°23'40.5"N 81°37'45.6"W	County: Cuyahoga	
City: Valley View	State: OH	Zip: 44125 -
Building Size (square feet): 3415	No. of Floors:	Age: 59
Present Use: Bridge	Prior Use:	

B. Type of Operation (check all that apply) **Revised?** ☐

☒ Demolition	☒ Renovation/Abatement – Type: ☒ Removal ☐ Repair ☐ Encapsulation ☐ Enclosure

C. Asbestos Present (check one) **Revised?** ☐

☒ Yes	☐ No	☐ No, previously abated Year Abated:

D. Approximate Amount of Asbestos-Containing Materials (complete table below and Section 1 #6 if asbestos is present) **Revised?** ☐

	Material to be Removed			Material NOT to be Removed	
		Non-friable Asbestos-Containing Material		Non-friable Asbestos-Containing Material	
	RACM	Category I	Category II	Category I	Category II
Pipes (linear feet)					
Surface area on other facility components (ft^2)			5		
Volume if length or area cannot be measured (ft^3)					

E. Asbestos Abatement Schedule and Abatement Specialist (original notification is required 10 working days prior to the start of work) **Revised?** ☐

Setup Date: / /	Abatement Date: / /				Complete Date: / /		
(Shift 1) Time start/end on site	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Abatement Specialist Name:		Certification #: AS			Expiration Date: / /		
(Shift 1) Time start/end on site	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Abatement Specialist Name:		Certification #: AS			Expiration Date: / /		

F. Demolition Contractor (if applicable) **Revised?** ☐

Name:		
Address:	Contact Person:	
City:	State:	Zip: -
Email:	Phone: ( ) -	Fax: ( ) -

G. Demolition Schedule (original notification is required 10 working days prior to the start of work) **Revised?** ☐

Start Date: / /	Complete Date: / /

H. Project Hold **Revised?** ☐

Hold Begin Date: / /	Work Resume Date: / /

DEPARTMENT OF THE ARMY PERMIT No. LRH-2021-00124-CUY
NATIONWIDE PERMIT No. 3

Special Provisions

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT
502 8TH STREET
HUNTINGTON, WV 25701-2018

November 19, 2021

Regulatory Division
South/Transportation Branch
LRH-2021-00124-CUY – Cuyahoga River
CUY-Old Rockside Road Bridge, PID 91563

Mr. Michael W. Dever, MPA
Cuyahoga County Department of Public Works
2079 East Ninth Street
Cleveland, Ohio 44115

Dear Mr. Dever:

I refer to the information received in this office on October 26, 2021, requesting the Nationwide Permit (NWP) 3 verification issued to the Ohio Department of Transportation (ODOT) on September 29, 2021 for the CUY-Old Rockside Road Bridge, PID: 91563 project be transferred to the Cuyahoga County Department of Public Works. This NWP 3 verification authorized the discharge of dredged or fill material into the Cuyahoga River associated with the replacement of the Old Rockside Road Bridge. The project is located between the City of Independence and the Village of Valley View in Cuyahoga County, Ohio (41.39461° North, 81.62924° West).

Based on the information submitted, you have accepted all terms and conditions of the NWP 3 authorization. By e-mail to this office on October 29, 2021, the ODOT has consented to the permit transfer. Effective the date of this letter, the enclosed NWP 3 verification has been transferred from the ODOT to the Cuyahoga County Department of Public Works.

If any changes in the location and plans of the work are found necessary, revised plans must be submitted to the United States Army Corps of Engineers, Buffalo District, Regulatory Branch and the Operations and Technical Support Section for approval(s) as required by law before the work can commence.

A copy of this letter has been provided to those on the enclosed Recipient List. For questions concerning the Section 408 permission synchronized with the NWP 3 authorization, please contact Jason Doktor at (716) 879-4385 or by email at Jason.P.Doktor@usace.army.mil. For questions concerning the original NWP 3 verification, please contact Brett Latta at (740) 221-4181 or by email at Brett.C.Latta@usace.army.mil.

Sincerely,

Susan A. Porter

Susan A. Porter
Chief, South/Transportation Branch

Enclosures

Recipient List

cc w/ enclosures via e-mail:

Mr. Brandon Beck
The Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049
Brandon.Beck@epa.ohio.gov

Ms. Adrienne Earley, M.S.
The Ohio Department of Transportation
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223
Adrienne.Earley@dot.ohio.gov

Mr. Matthew Raymond
The Ohio Department of Transportation
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223
Matt.Raymond@dot.ohio.gov

Mr. Jeffrey Boyles
The Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049
Jeffrey.Boyles@epa.ohio.gov

Ms. Lindsey M. Korfel
The U.S. Fish and Wildlife Service
4625 Morse Road, Suite 104
Columbus, Ohio 43230
Lindsey_Korfel@fws.gov

Mr. Robert Remmers
The U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207
Robert.W.Remmers@usace.army.mil

Mr. Donald Ramm
City of Independence Engineering Department
6335 Selig Drive
Independence, Ohio 44131
rammdo@independenceohio.org

Ms. Lori Birschbach-Tober
Cuyahoga County Department of Public Works
2079 East Ninth Street
Cleveland, Ohio 44115
lbirschbachtober@cuyahogacounty.us

Mr. Mike Pettegrew
The Ohio Department of Natural Resources
Office of Real Estate & Land Management
2045 Morse Road, Building E-2
Columbus, Ohio 43229-6693
Mike.Pettegrew@dnr.ohio.gov

Mr. Mark Scalabrino
The United States Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207-3199
Mark.W.Scalabrino@usace.army.mil

Ms. Karen Hallberg, Ph.D.
The U.S. Fish and Wildlife Service
4625 Morse Road, Suite 104
Columbus, Ohio 43230
Karen_Hallberg@fws.gov

Mr. Jason Doktor
The U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207
Jason.Doktor@usace.army.mil

Mr. Joshua Feldman, P.E.
The U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207
Joshua.J.Feldman@usace.army.mil

Ms. Mary Rody
The Ohio History Connection
800 East 17th Avenue
Columbus, Ohio 43211-2474
mrody@ohiohistory.org

Mr. Eric Semple
National Park Service
U.S. Department of the Interior
Cuyahoga Valley National Park
15610 Vaughn Road
Brecksville, Ohio 44141
eric_semple@nps.gov

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT
502 8TH STREET
HUNTINGTON, WV 25701

September 29, 2021

Regulatory Division
South/Transportation Branch
LRH-2021-00124-CUY – Cuyahoga River
CUY-Old Rockside Road Bridge, PID 91563

Mr. Timothy Hill
The Ohio Department of Transportation
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223

Dear Mr. Hill:

This letter is in response to your Pre-Construction Notification (PCN) requesting a Department of the Army (DA) authorization for the discharge of dredged or fill material into the Cuyahoga River associated with the replacement of the Old Rockside Road Bridge. The proposed project is located between the City of Independence and the Village of Valley View in Cuyahoga County, Ohio (41.39461° North, 81.62924° West). The proposed discharges of dredged or fill material into the Cuyahoga River represent one (1) single and complete project.

The United States Army Corps of Engineers' (Corps) authority to regulate waters of the United States is based on the definitions and limits of jurisdiction contained in 33 CFR 328 and 33 CFR 329. Section 404 of the Clean Water Act (Section 404) requires a DA permit be obtained prior to discharging dredged or fill material into waters of the United States, including wetlands. Section 10 of the Rivers and Harbors Act of 1899 (Section 10) requires a DA permit be obtained for any work in, on, over or under a navigable water. The Cuyahoga River is a navigable water from the mouth to the confluence of the Little Cuyahoga River in Akron, Ohio (41.1 miles).

The proposed CUY-Old Rockside Road Bridge project, as described in the submitted PCN, has been reviewed in accordance with Section 404. In the PCN, and as summarized in the enclosed Table 1, you have requested a DA authorization for both permanent and temporary discharges of dredged or fill material into 66 linear feet and 64 linear feet of the Cuyahoga River, respectively, associated with the construction of the proposed CUY-Old Rockside Road Bridge project. All work will be conducted in accordance with the submitted PCN received in this office on February 10, 2021, including the final plan set dated May 2021.

Based on the provided information, it has been determined the proposed discharges of dredged or fill material into the Cuyahoga River in conjunction with the construction of the proposed CUY-Old Rockside Road Bridge project meet the criteria for Nationwide Permit (NWP) No. 3, *Maintenance*, under the January 6, 2017 Federal Register (FR), Issuance and

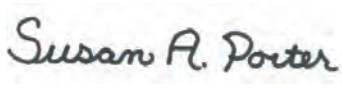
Reissuance of NWPs (82 FR 1860). **The enclosed special conditions are hereby included as part of this verification and must be met to validate this authorization.** The Ohio Environmental Protection Agency (Ohio EPA) issued a general Section 401 Water Quality Certification (401 WQC) with conditions for this NWP on March 17, 2017. Copies of the NWP and the 401 WQC can be found at https://www.lrh.usace.army.mil/Portals/38/docs/regulatory/2016-00006-OH.pdf?ver=2019-01-03-091608-120.

This verification will remain valid until the expiration date of the NWP (March 18, 2022), unless the NWP authorization is modified, suspended, or revoked. The verification will remain valid if the NWP authorization is reissued without modification or the activity complies with any subsequent modification of the NWP authorization. Prior to the expiration date, it is not necessary to contact this office for re-verification of your project unless the plans for the proposed activity are modified. Furthermore, if you commence or under contract to commence the proposed activity before March 18, 2022, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

Please be aware this NWP authorization does not obviate the requirement to obtain other Federal, state, or local authorizations required by law. A copy of this NWP and verification letter must be supplied to your project engineer responsible for construction activities. A copy of the verification letter must be kept at the site during construction.

Upon completion of the work, the enclosed certification must be signed and returned to this office. A copy of this letter has been provided to those on the enclosed Recipient List. If you have any questions concerning the above, please contact Brett Latta of the Columbus Field Office at (614) 692-4672 or by e-mail at Brett.C.Latta@usace.army.mil.

Sincerely,



Susan A. Porter
Chief, South/Transportation Branch

Enclosures

Recipient List

cc w/ enclosures via e-mail:

Mr. Brandon Beck
The Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049
Brandon.Beck@epa.ohio.gov

Ms. Adrienne Earley, M.S.
The Ohio Department of Transportation
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223
Adrienne.Earley@dot.ohio.gov

Mr. Matthew Raymond
The Ohio Department of Transportation
1980 West Broad Street, Mail Stop 4170
Columbus, Ohio 43223
Matt.Raymond@dot.ohio.gov

Mr. Jeffrey Boyles
The Ohio Environmental Protection Agency
Division of Surface Water
P.O. Box 1049
Columbus, Ohio 43216-1049
Jeffrey.Boyles@epa.ohio.gov

Ms. Lindsey M. Korfel
The U.S. Fish and Wildlife Service
4625 Morse Road, Suite 104
Columbus, Ohio 43230
Lindsey_Korfel@fws.gov

Mr. Robert Remmers
The U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207
Robert.W.Remmers@usace.army.mil

Mr. Donald Ramm
City of Independence Engineering Department
6335 Selig Drive
Independence, Ohio 44131
rammdo@independenceohio.org

Ms. Kyla Maunz, PWS
The Ohio Department of Natural Resources
Office of Real Estate & Land Management
2045 Morse Road, Building E-2
Columbus, Ohio 43229
Kyla.Maunz@dnr.ohio.gov

Mr. Mike Pettegrew
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2045 Morse Road, Building E-2
Columbus, Ohio 43229-6693
Mike.Pettegrew@dnr.ohio.gov

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Mr. Jason Doktor
The U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207
Jason.Doktor@usace.army.mil

Mr. Thomas Arbour
The Ohio Department of Natural Resources
Division of Parks and Watercraft
2045 Morse Road, Building C-4
Columbus, Ohio 43229-6693
Thomas.Arbour@dnr.ohio.gov

Ms. Mary Rody
The Ohio History Connection
800 East 17th Avenue
Columbus, Ohio 43211-2474
mrody@ohiohistory.org

Mr. Eric Semple
National Park Service
U.S. Department of the Interior
Cuyahoga Valley National Park
15610 Vaughn Road
Brecksville, Ohio 44141
eric_semple@nps.gov

SPECIAL CONDITIONS OF NWP VERIFICATION ISSUED TO
THE OHIO DEPARTMENT OF TRANSPORTATION
LRH-2021-00124-CUY – Cuyahoga River
CUY-Old Rockside Road Bridge, PID 91563

1. All work will be conducted in accordance with the Final Plans (Final Submittal May 2021) for the CUY-Old Rockside Road Bridge project.

2. The permittee's authorization under this verification is conditional upon their compliance with all of the mandatory terms and conditions of the *Framework Programmatic Biological Opinion (PBO) on the Ohio Department of Transportation's Federal-Aid Highway Program for the Federally Endangered Indiana Bat (Myotis sodalis) and Federally Threatened Northern Long-eared Bat (Myotis septentrionalis)*, submitted to the Ohio Department of Transportation (ODOT) and executed on 29 February 2016.

3. To ensure the activity does not adversely affect the Flood Risk Management Project for the City of Independence, Ohio, the enclosed U.S. Army Corps of Engineers, Buffalo District, Categorical Permission under 33 U.S.C. 408, signed on September 21, 2021 for the CUY-Old Rockside Road Bridge project, including all special conditions attached to or contained within, are hereby incorporated by reference as being special conditions of this permit.

4. The permittee shall ensure construction is scheduled to avoid or minimize any impacts to navigation traffic (i.e., canoes). Navigational traffic shall be maintained throughout the construction of the project, except when overhead activities are being performed, such as the addition or removal of bridge beams, and the addition or removal of deck forms. The signage, portage, and notification requirements listed in the ODOT's "Environmental Document for CUY Old Rockside Road Bridge PID 91563," approved on March 12, 2021, are hereby incorporated by reference as being special conditions of this authorization. All coordination and notification, including any proposed river closure, shall be through ~~Mr. Thomas Arbour of~~ the Ohio Department of Natural Resources at (614) 265-6575 or ~~Thomas.Arbour@dnr.ohio.gov~~. **Natalie.Pirvu@dnr.ohio.gov**

5. No in-water work, including dewatering, shall occur in the Cuyahoga River from April 15 through June 30 to reduce impacts to aquatic species and their habitat.

Table 1
Nature of Proposed Discharges of Dredged or Fill Material
Nationwide Permit 3, *Maintenance*
LRH-2021-00124-CUY; CUY-Old Rockside Road Bridge, PID: 91563

Aquatic Resource	Station	Regulated Activity	Permanent			Temporary[1]		
			Fill Volume (cy)	Fill Area (ac)	Length (lf)	Fill Volume (cy)	Fill Area (ac)	Length (lf)
Cuyahoga River (Mile 13.2)	31+25 to 32+50	Piers/piles, erosion control, and construction access	491.0	0.053	66	1,240	0.100	64
Cumulative Fill Total (rounded)			**491**	**0.05**	**66**[2]	**1,240**	**0.100**	**64**[2]

[1] Note: A temporary clear-span bridge to maintain traffic would require no discharge of dredged or fill material.
[2] Note: No stream mitigation is required.

U.S. Army Corps of Engineers
Huntington District

Permit Number: LRH-2021-00124-CUY

Name of Permittee: The Ohio Department of Transportation **(see below)**

Date of Issuance: 29 September 2021 **(transferred to Cuyahoga County Department of Public Works on 19 November 2021)**

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Huntington District
Ohio Regulatory Transportation Office
Building 10 / Section 10
PO Box 3990
Columbus, Ohio 43218-3990

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above-referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____
Signature of Permittee Date

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BUFFALO DISTRICT
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

Operations Branch

Mr. Donald Ramm
City Engineer
City of Independence
6335 Selig Drive
Independence, OH 44131

Section 408 Request Number: 408-LRB-2021-0027

Dear Mr. Ramm:

The Buffalo District of the U.S. Army Corps of Engineers (USACE) has completed review of your request for the Old Rockside Road Bridge Replacement at the proposed Cuyahoga River, Independence, Ohio Flood Risk Management Project to be operated and maintained by the non-federal sponsor, the City of Independence. This evaluation was performed under Section 14 of the Rivers and Harbors Act of 1899, 33 U.S.C. 408 (Section 408) and is consistent with Engineer Circular (EC) 1165-2-220.

The alteration request was determined to be consistent with the terms and conditions of the Buffalo District Categorical Permission (CP) under category type "Bridges (Simple)". Therefore, USACE grants permission for the proposed work contingent upon compliance to the conditions annotated on the enclosed Alteration Conditions Form (ACF).

Should you have any questions or require additional information regarding this matter, please contact Robert W. Remmers, Chief, Operations and Technical Support Section, in writing at the above address, by phone at (716) 879-4277 or by email at robert.w.remmers@usace.army.mil.

Sincerely,

FELDMANN.JOSHUA.JOHN[redacted]
Digitally signed by FELDMANN.JOSHUA.JOHN[redacted]
Date: 2021.09.21 08:36:14 -05'00'

Joshua Feldmann, P.E.
Chief, Operations Branch

Enclosure: ACF

ALTERATION CONDITIONS FORM: Old Rockside Road Bridge Replacement over Cuyahoga River, Independence, OH FRM Project

1. **Purpose:** The purpose of the Alteration Conditions Form (ACF) is to document the scope of the requested alteration, the parties involved, and conditions to which the permission is granted contingent upon the Requestor's compliance.

2. **Name of Inspection of Completed Works (ICW) Project:** Cuyahoga River, Independence, OH Flood Risk Management (FRM) Project

3. **Title of Alteration:** Old Rockside Road Bridge Replacement

4. **Points of Contact:**

   a. **Government:**

Name:	Robert Remmers, PE, PMP
Title:	Chief, Operations and Technical Support Section
Agency:	U.S. Army Corps of Engineers, Buffalo District
Address:	1776 Niagara St. Buffalo, NY 14207
Phone Number:	(716) 879-4277
E-Mail Address:	robert.w.remmers@usace.army.mil

   b. **Requestor:**

Name:	Donald Ramm
Title:	City Engineer
Agency:	City of Independence
Address:	6335 Selig Drive Independence, OH 44131
Phone Number:	(216) 524-1374
E-Mail Address:	rammdo@independenceohio.org

   c. **Non-federal Sponsor:**

Name:	
Title:	
Agency:	City of Independence
Address:	6335 Selig Drive Independence, OH 44131
Phone Number:	(216) 524-1374
E-Mail Address:	rammdo@independenceohio.org

5. **The following documents have been provided in support of this alteration request**:

   a. Section 408 Request to Alter, Impact, or Encroach upon a Buffalo District Inspection of Completed Works Project dated 6/17/21.

b. Project Location Mapping, Plan Sheets, Hydraulic Analysis, ODOT NEPA Documentation, Project Photographs, and Correspondence and Approvals.

6. Scope of Work:

The project proposes to replace the deteriorating bridge that carries Old Rockside Road over the Cuyahoga River. The Old Rockside Road bridge replacement consists of a 247-foot long, 3-span continuous steel beam with composite reinforced concrete deck structure and substructures with semi-integral abutments. The new bridge will have two 12-foot lanes with a 7-foot sidewalk on the south side. A pier will be removed from the thalweg of the Cuyahoga River and rock channel protection will be placed below the bridge along the banks of the Cuyahoga River. A temporary off-line bridge will be constructed north of the existing bridge to maintain traffic during the bridge replacement. The construction timeframe is approximately October 2021 to September 2023.

7. Permission and Conditions:

Based on this evaluation, the USACE - Buffalo District grants permission to the City of Independence to alter the FRM project, as described herein, contingent upon compliance with the Standard Conditions annotated below.

LIMITS OF THE AUTHORIZATION

1. This permission only authorizes you, the requester, to undertake the activity described herein under the authority provided in Section 14 of the Rivers and Harbors Act of 1899, as amended (33 USC 408). This permission does not obviate the need to obtain other federal, state, or local authorizations required by law. This permission does not grant any property rights or exclusive privileges, and you must have appropriate real estate instruments in place prior to construction and/or installation.

2. The time limit for completing the work authorized ends December 31, 2023. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

3. Without prior written approval of the USACE, you must neither transfer nor assign this permission nor sublet the premises or any part thereof, nor grant any interest, privilege or license whatsoever in connection with this permission. Failure to comply with this condition will constitute noncompliance for which the permission may be revoked immediately by USACE.

4. The requester understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration of the work herein authorized, or if, in the opinion of the Secretary of the Army or an authorized representative, said work will cause unreasonable conditions and/or obstruction of USACE project authorized design, the requester will be required upon due notice from the USACE, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim can be made against the United States on account of any such removal or alteration.

INDEMNIFICATION AND HOLD HARMLESS

5. The United States will in no case be liable for:
   a. any damage or injury to the structures or work authorized by this permission that may be caused or result from future operations undertaken by the United States, and no claim or right to compensation will accrue from any damage; or
   b. damage claims associated with any future modification, suspension, or revocation of this permission.

6. The United States will not be responsible for damages or injuries which may arise from or be incident to the construction, maintenance, and use of the project requested by you, nor for damages to the property or injuries to your officers, agents, servants, or employees, or others who may be on your premises or project work areas or the federal project(s) rights-of-way. By accepting this permission, you hereby agree to fully defend, **indemnify,** and **hold harmless** the United States and USACE from any and all such claims, subject to any limitations in law.

7. Any damage to the water resources development project or other portions of any federal project(s) resulting from your activities must be repaired at your expense.

REEVALUATION OF PERMISSION

8. The determination that the activity authorized by this permission would not impair the usefulness of the federal project and would not be injurious to the public interest was made in reliance on the information you provided.

9. This office, at its sole discretion, may reevaluate its decision to issue this permission at any time circumstances warrant, which may result in a determination that it is appropriate or necessary to modify or revoke this permission. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. you fail to comply with the terms and conditions of this permission;
b. the information provided in support of your application for permission proves to have been inaccurate or incomplete; or
c. significant new information surfaces which this office did not consider in reaching the original decision that the activity would not impair the usefulness of the water resources development project and would not be injurious to the public interest.

CONDUCT OF WORK UNDER THIS PERMISSION

10. You are responsible for implementing any requirements for mitigation, reasonable and prudent alternatives, or other conditions or requirements imposed as a result of environmental compliance.

11. Work/usage allowed under this permission must proceed in a manner that avoids interference with the inspection, operation, and maintenance of the federal project.

12. In the event of any deficiency in the design or construction of the requested activity, you are solely responsible for taking remedial action to correct the deficiency.

13. The right is reserved to the USACE to enter upon the premises at any time and for any purpose necessary or convenient in connection with government purposes, to make inspections, to operate and/or to make any other use of the lands as may be necessary in connection with government purposes, and you will have no claim for damages on account thereof against the United States or any officer, agent or employee thereof.

14. You must provide copies of pertinent design, construction, and/or usage submittals/documents. USACE may request that survey and photographic documentation of the alteration work and the impacted project area be provided before, during, and after construction and/or installation.

15. You may be required to perform an inspection of the federal project with the USACE, prior to your use of the structure, to document existing conditions.

16. USACE shall not be responsible for the technical sufficiency of the alteration design nor for the construction and/or installation work.

17. Once permission is granted, you must notify the Buffalo District at least 10 business days before work is started so that post permission oversight can be performed, if deemed necessary, by USACE.

18. You must submit a copy of as-built drawings within 120 days of completion of work showing the new work as it relates to identifiable features of the federal project.

SPECIAL CONDITIONS

19. The City of Independence will be responsible for operations and maintenance of the Old Rockside Bridge Replacement as it pertains to the FRM project.

NATIONWIDE PERMITS FOR THE STATE OF OHIO

**U.S. ARMY CORPS OF ENGINEERS (CORPS) REGULATORY PROGRAM
REISSUANCE AND ISSUANCE OF NATIONWIDE PERMITS
WITH OHIO EPA 401 WATER QUALITY CERTIFICATION
AND OHIO DEPARTMENT OF NATURAL RESOURCES CONSISTENCY
DETERMINATION UNDER THE COASTAL ZONE MANAGEMENT ACT**

NWP 3

3. ***Maintenance.*** (a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP also authorizes the removal of previously authorized structures or fills. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project. This NWP also authorizes the removal of accumulated sediment and debris within, and in the immediate vicinity of, the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.). The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization.

(c) This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are

necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Authorities: Section 10 of the Rivers and Harbors Act of 1899 and section 404 of the Clean Water Act (Sections 10 and 404))

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act section 404(f) exemption for maintenance.

Corps NWP 3 Specific Regional Conditions:

a. PCN in accordance with Nationwide Permit General Condition 32 and Regional General Condition 6 is required for the following activities:

   - The replacement of any permanent vertical bulkhead greater than one foot waterward of the original alignment. A vertical bulkhead is defined as any structure, or fill, with a vertical face. It may be constructed of timber, steel, concrete, etc.;
   - Activities in Section 10 waters that involve the discharge of greater than 10 cubic yards of dredged and/or fill material below the ordinary high water mark;
   - For temporary structures, work, and discharges (including cofferdams) necessary for access fills or dewatering of construction sites occurring in Section 10 waters when the primary activity is otherwise authorized by the Corps of Engineers. The PCN must include a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions;
   - All activities in the Ohio River and the Muskingum River; and
   - Any stream channel modification that exceeds a distance of 50 feet upstream and 50 feet downstream of the structure.

b. The placement of any new rip-rap when associated with an existing bridge or similar structure is limited to a total of 200 feet extending in either direction from the structure unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects..

c. For projects located along the shorelines of Lake Erie, Sandusky Bay, and Maumee Bay, all sand and gravel located below the proposed project, both below and above ordinary high water mark (573.4 feet IGLD 1985), will be excavated down to clay or bedrock, and side cast into the nearshore area either immediately waterward or downdrift of the project area. It will be at the discretion of the district engineer to determine whether the material located below the authorized structure needs to be relocated, where it should be relocated to, and the appropriate authorization, if needed, for the relocation. Verification of the placement of the excavated material within the nearshore area shall be documented through the submittal of dated photographs and an accompanying photo location map to the district engineer within 30 days of commencement of the project.

Ohio 401 Certification Special Limitations and Conditions:

1. Ohio state certification general limitations and conditions apply to this nationwide permit.

2. Temporary or permanent impacts to category 3 wetlands are limited to less than 0.1 acres for activities involving the repair, maintenance, replacement, or safety upgrades to existing infrastructure that meets the definition of public need. Ohio EPA will make the determination if a project meets public need during the ORAM verification process.

3. Temporary or permanent impacts to category 1 and category 2 wetlands are limited to 0.50 acres.

4. This certification does not authorize the replacement of existing structures that are open to the flow of water with structures that are not open to the flow of water.

5. For an individual stream, while the repair or replacement of an existing culvert of any length is not limited by this certification, any culvert extension shall not exceed 300 linear feet.

6. Replacement vertical bulkheads shall not be placed more than an average of one foot waterward of the intersection of the ordinary high water mark of the waterbody and the existing shoreline.

7. Removal of accumulated sediment shall occur only once per year and shall be limited to low-flow conditions, except in cases of emergency situations that threaten life or property.

8. For projects which involve temporary impacts to wetlands: upon the cessation of earth moving activities, any hydric topsoil removed from a wetland shall be separated and saved for later placement as the topmost backfill layer when the wetland is restored to grade.

Ohio CZMA Federal Consistency Determination Condition:

For all activities located within or along the shore of Ohio's portion of Lake Erie, including Maumee Bay and Sandusky bay, all applicable authorizations under the Ohio Coastal Management Program must be obtained.

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for a NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. **Navigation.** (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. **Aquatic Life Movements.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. **Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through

excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. **Migratory Bird Breeding Areas. A**ctivities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. **Shellfish Beds.** No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. **Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. **Water Supply Intakes.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. **Adverse Effects From Impoundments.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. **Management of Water Flows.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. **Fills Within 100-Year Floodplains.** The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. **Equipment.** Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. **Soil Erosion and Sediment Controls.** Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. **Removal of Temporary Fills.** Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. **Proper Maintenance.** Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. **Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. **Wild and Scenic Rivers.** (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. **Tribal Rights.** No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. **Endangered Species.** (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to

determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. **Migratory Birds and Bald and Golden Eagles.** The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. **Historic Properties**. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR

330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. **Discovery of Previously Unknown Remains and Artifacts.** If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district

engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. **Designated Critical Resource Waters.** Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. **Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of

streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation

plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. **Safety of Impoundment Structures.** To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. **Water Quality.** Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or

State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. **Coastal Zone Management.** In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. **Regional and Case-By-Case Conditions.** The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. **Use of Multiple Nationwide Permits.** The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. **Transfer of Nationwide Permit Verifications.** If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

30. **Compliance Certification.** Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and

implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. **Activities Affecting Structures or Works Built by the United States.** If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. **Pre-Construction Notification.** (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision.

Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the “study river” (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat

conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2-acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters (e.g., streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

Nationwide Permits Regional General Conditions

1. Nationwide Permits shall not authorize any activity which negatively impacts bogs and/or fens.

2. No nationwide permit may be used in Lake Erie for purposes of diverting water from the Great Lakes.

3. Nationwide Permits shall not authorize any activity which has an adverse impact on littoral transport within Lake Erie.

4. **In-Water Work Exclusion Dates:** Any regulated work associated with a nationwide permit cannot take place during the restricted period of the following Ohio Department of Natural Resources (ODNR) In-Water Work Restrictions, unless the applicant receives advanced written approval from the ODNR and notifies the district engineer in accordance with Nationwide Permit General Condition 32 and Regional General Condition 6 and receives written approval from the Corps:

Location	**Restricted Period**
Percid streams a	3/15 - 6/30
Salmonid streams b	9/15 - 6/30
Other streams c	4/15 - 6/30

a. **Great Miami River** (dam south of New Baltimore to mouth), **Hocking River** (falls at White's Mill to mouth), **Little Miami River** (dam at Waynesville to mouth), **Maumee River** (split dam at Grand Rapids to mouth), **Maumee Bay**, **Muskingum River** (Devola Dam No.2 north of Marietta to mouth), **Ohio Brush Creek** (S.R. 32 bridge to mouth), **Ohio River** (entire reach), **Portage River** (entire reach), **Sandusky River** (first dam to mouth), **Sandusky Bay**, **Scioto River** (S.R. 207 bridge north of Chillicothe to mouth), **Toussaint River** (entire reach).

b. **Arcola Creek** (entire reach), **Ashtabula River** (Hadlock Rd. to mouth), **Ashtabula Harbor**,

Aurora Branch (Chagrin River (RM 0.38 to mouth)), **Big Creek** (Grand River (Girdled Road to mouth)), **Black River** (entire reach), **Chagrin River** (Chagrin Falls to mouth), **Cold Creek** (entire reach), **Conneaut Creek** (entire reach), **Conneaut Harbor**, **Corporation Creek** (Chagrin River (entire reach)), **Cowles Creek** (entire reach), **Ellison Creek** (Grand River (entire reach)), **Euclid Creek** (entire reach), **Grand River** (dam at Harpersfield Covered Bridge Park to mouth), **Fairport Harbor**, **Gulley Brook** (Chagrin River (entire reach)), **Huron River** (East Branch-West Branch confluence to mouth) **Indian Creek** (entire reach), **Kellogg Creek** (Grand River (entire reach)), **Mill Creek** (Grand River (entire reach)), **Paine Creek** (Grand River (Paine Falls to mouth)), **Rocky River** (East Branch-West Branch confluence to mouth), **Smokey Run** (Conneaut Creek (entire reach)), **Turkey Creek** (entire reach), **Vermilion River** (dam at Wakeman upstream of the US 20 & SR 60 bridge to mouth), **Ward Creek** (Chagrin River (entire reach)), **Wheeler Creek** (entire reach), **Whitman Creek** (entire reach).

c. **Exceptional Warmwater Habitat, Cold Water Habitat, Warmwater Habitat,** or streams with known occurrences of threatened and/or endangered (T&E) species. Includes **Lake Erie & bays** not listed above. Special conditions (such as occurrence of T &E species) may mandate local variation of restrictions.

Note 1: To determine the defined Aquatic Life Habitat designation for a stream and project segment, refer to: www.epa.ohio.gov/dsw/rules/3745_1.aspx

Note 2: This condition does not apply to Ohio Department of Transportation projects that are covered under the "Memorandum of Agreement Between The Ohio Department of Transportation, The Ohio Department of Natural Resources, and The United States Fish and Wildlife Service For Interagency Coordination For Projects Which Require Consultation Under the Endangered Species Act, Impact State Listed Species, and/or Modify Jurisdictional Waters 2016 Agreement Number: 19394".

5. **Waters of Special Concern:** PCN in accordance with Nationwide Permit General Condition 32 and Regional General Condition 6 is required for regulated activities in the following resources:

a. **Endangered Species and Threatened Species:** Due to the potential presence of federally threatened or endangered species or their habitats, Notification in accordance with Nationwide Permit General Condition 32, Regional General Condition 6 and General Condition 18 is required for any regulated activity in jurisdictional waters of the United States in Ohio that includes:

- the removal of trees providing suitable roosting, foraging, or traveling habitat for the federally-listed endangered Indiana bat and the federally-listed threatened northern long-eared bat. Suitable roosting, foraging, and traveling habitat is defined as forests, woodlots, fencerows comprised of trees, riparian forests, or other wooded corridors containing live trees and/or snags ≥3 inches diameter at breast height (dbh). Individual trees may be considered suitable habitat when they are ≥3 inches diameter at breast height (dbh) and have any exfoliating bark, cracks, crevices, hollows and/or cavities and are located within 1,000 feet (305 meters) of other forested/wooded habitat; or

- regulated work in the waterway or township of the corresponding counties listed in Appendix 1.

*__Note 1:__ Applicants must ensure they are referencing the latest version of Appendix 1 by contacting their nearest Corps district office and visiting the online resources identified in General Condition 18(f) of these NWPs, since federally-listed species are continuously listed, proposed for listing, and/or de-listed.

*__Note 2:__ As mentioned in General Condition 18-Endangered Species, Federal Agencies should follow their own procedures for complying with the requirements of the ESA. Federal applicants, including applicants that have received federal funding, must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

*__Note 3:__ Suitable summer habitat for the federally-listed endangered Indiana bat and the federally-listed threatened northern long-eared bat consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches diameter at breast height (dbh) that have any exfoliating bark, cracks, crevices, hollows and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

*__Note 4:__ Appendix 1 is not applicable to the federally-listed endangered Indiana bat and the federally-listed threatened northern long-eared bat as both of these mammal species are known to occur throughout the State of Ohio. Appendix 1 column 1 is specific to federally-listed endangered, threatened, or proposed federally-listed endangered or threatened aquatic species (i.e. mussels and fish). Appendix 1 column 2 is specific to federally-listed endangered, threatened, or proposed federally-listed endangered or threatened semi-aquatic and terrestrial species (i.e. insects, birds, reptiles, amphibians).

b. **Critical Resource Waters:**

- In Ohio, two areas have been designated critical habitat for the piping plover (*Charadrius melodus*) and are defined as lands 0.62 mile inland from normal high water line. Unit OH-1 extends from the mouth of Sawmill Creek to the western property boundary of Sheldon Marsh State Natural Area, Erie County, encompassing approximately 2.0 miles. Unit OH-2 extends from the eastern boundary line of Headland Dunes Nature Preserve to the western boundary of the Nature Preserve and Headland Dunes State Park, Lake County, encompassing approximately 0.5 mile.

- In Ohio, three areas have been designated critical habitat for the rabbitsfoot mussel (*Quadrula cylindrica cylindrica*). Unit RF26 includes 17.5 rkm (10.9 rmi) of the

Walhonding River from the convergence of the Kokosing and Mohican Rivers downstream to Ohio Highway 60 near Warsaw, Coshocton County, Ohio. Unit RF27 includes 33.3 rkm (20.7 rmi) of Little Darby Creek from Ohio Highway 161 near Chuckery, Union County, Ohio, downstream to U.S. Highway 40 near West Jefferson, Madison County, Ohio. Unit RF29 includes 7.7 rkm (4.8 rmi) of Fish Creek from the Indiana and Ohio State line northwest of Edgerton, Ohio, downstream to its confluence with the St. Joseph's River north of Edgerton, Williams County, Ohio.

- Old Woman Creek National Estuarine Research Preserve.

c. **Oak Openings:** Wetland activities conducted in the Oak Openings Region of Northwest Ohio located in Lucas, Henry, and Fulton counties. For a map of the Oak Openings Region, visit http://metroparkstoledo.com/media/2340/oak-openings-metropark.pdf

6. **PCN Submittals:** In addition to the information required under Nationwide Permit General Condition 32, the following information must be provided with the PCN:

a. **Illustrations/Drawings:** The illustrations/drawings must clearly depict the project boundaries and include all elements and phases of the proposed work, latitude and longitude of the project site, and the county where the proposed work would occur. Three types of illustrations or drawings are required to properly depict the work proposed to be undertaken. These illustrations or drawings are identified as a Vicinity Map (i.e. a location map such as a USGS topographical map), a Plan View and a Typical Cross-Section. Each illustration or drawing should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross-section). In addition, each illustration or drawing should be identified with a figure or attachment number.

b. **United States Fish & Wildlife Service (USFWS):** Sufficient information must be provided in the PCN to determine the proposed activity's compliance with NWP General Condition 18. Prior to submitting PCN, it is recommended that the applicant contact the USFWS, Ohio Ecological Services Field Office by phone at (614) 416-8993, by e-mail at ohio@fws.gov, or by writing to 4625 Morse Road, Suite 104, Columbus, Ohio 43230. The USFWS can provide information to assist in complying with Nationwide Permit General Condition 18 pertaining to endangered species and Nationwide Permit General Condition 19 pertaining to migratory birds and bald and golden eagles. The USFWS can also provide project recommendations specific to Federal Candidate species. Federal Candidate species are those for which the USFWS has sufficient information to propose them as endangered or threatened under the Endangered Species Act, but for which a listing proposal is precluded by other higher priority listing activities. All relevant information obtained from the USFWS should be submitted with the Notification.

c. **Cultural Resources:** Sufficient information must be provided in the PCN to determine the proposed activity's compliance with NWP General Condition 20. The PCN should provide justified conclusions concerning whether or not the proposed activity could affect any historic properties listed, determined to be eligible, or which you have reason to believe may be eligible, for listing on the National Register of Historic Places (NRHP). This data

will be used by the Corps to determine if the proposed activity has the potential to affect historic properties. Be advised that further effort may be required to take into account the effects the proposed activity may have on historic properties, as required by the National Historic Preservation Act of 1966. To ensure compliance with Nationwide Permit General Condition 20, the following basic project information is needed:

- A detailed description of the project site in its current condition (i.e. prior to construction activities) including information on the terrain and topography of the project site, the acreage of the project site, the proximity of the project site to major waterways, and any known disturbances within the project site. Photographs, keyed to mapping, are also needed which show the site conditions and all buildings or structures both within the project site and on adjacent parcels;

- A detailed description of past land uses in the project site. Particular attention should be given to past activities pertinent to the potential for historic properties to exist in the project area. Photographs and maps supporting past land uses should be provided as available;

- A detailed description of the construction activities proposed to take place on the project site and a comparison of how the site will look after completion of the project compared to how it looked before the project;

- Information regarding any past cultural resource studies or coordination pertinent to the project area, if available; and

- Any other data the applicant deems pertinent.

The applicant is encouraged to consult with the Ohio State Historic Preservation Office (OSHPO) staff and professionals meeting the Professional Qualification Standards as set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) during this data gathering process. These professionals can assist with compiling the basic project information discussed above and should provide recommendations as to whether or not the proposed project has the potential to affect historic properties and if further effort is required or not required to identify historic properties or assess potential effects to historic properties. These professionals can also compile basic preliminary review information to submit to the district engineer. A preliminary resource review encompasses a search radius of two (2) miles, centered on the project area, and consists of the following resources:

- OSHPO United States Geological Survey (USGS) 7.5' series topographic maps;

- Ohio Archaeological Inventory (OAI) files;

- Ohio Historic Inventory files (OHI);

- OSHPO Cultural Resources Management (CRM)/contract archaeology files;

- NRHP files including Historic Districts; and

- County atlases, histories and historic USGS 15' series topographic map(s).

As an alternative to submitting the information described above, the applicant may choose to complete the OSHPO Section 106 Review Project Summary Form or request comments from the OSHPO and the District Engineer on specific requirements appropriate to the particular circumstances of the project. Similarly, the applicant may choose to hire someone meeting the Professional Qualification Standards as set forth in the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716) to conduct what they recommend to be appropriate historic property identification efforts (e.g. archaeological survey and/or historic structure inventories) to expedite the review process. Be advised, undertaking identification efforts prior to consideration of the potential of the proposed activity to affect historic properties by the Corps in not without risk. It is possible that previous efforts could be determined insufficient or even potentially unnecessary once reviewed by the Corps and other consulting parties.

Upon receipt and review of the information listed above, the Corps will evaluate the submittal. If Corps determines the proposed activity has the potential to cause effects to a historic property, the Corps will seek consulting parties. In consultation with those parties, the Corps will scope appropriate historic property identification efforts and take into account the effect of the proposed activity on historic properties.

d. **National Wild and Scenic Rivers:** Prior to submitting a PCN for work in a National Wild and Scenic River System, it is recommended that the applicant contact the National Park Service Regional Wild and Scenic Rivers Specialist, at the Midwest Regional Office, 601 Riverfront Drive, Omaha, Nebraska 68102, for assistance in complying with Nationwide Permit General Condition 17. Any determination provided by the National Park Service should be submitted with the PCN. The following are components of the National Wild and Scenic River System and require PCN to the Corps:

Big and Little Darby Creeks (National Wild and Scenic River System):

- Big Darby Creek from Champaign-Union County line downstream to the Conrail railroad trestle and from the confluence with the Little Darby Creek downstream to the Scioto River.
- Little Darby Creek from the Lafayette-Plain City Road bridge downstream to within 0.8 mile from the confluence with Big Darby Creek.
- Total designation is approximately 82 miles.

Little Beaver Creek (National Wild and Scenic River System):

- Little Beaver Creek main stem, from the confluence of West Fork with Middle Fork near Williamsport to mouth.
- North Fork from confluence of Brush Run and North Fork to confluence of North Fork with main stem at Fredericktown.
- Middle Fork from vicinity of Co. Rd. 901 (Elkton Road) bridge crossing to confluence of

Middle Fork with West Fork near Williamsport.
- West Fork from vicinity of Co. Rd. 914 (Y-Camp Road) bridge crossing east to confluence of West Fork with Middle Fork near Williamsport.
- Total designation is 33 miles.

Little Miami (National Wild and Scenic River System)
- Little Miami River - St. Rt. 72 at Clifton to the Ohio River
- Caesar Creek: lower two miles of Caesars Creek.
- Total designation is 94 miles.

e. **Agency Coordination:** To assist in agency coordination, a complete compact disc (CD) copy shall be submitted for any PCN Package greater than 15 pages and/or includes maps, drawings, spreadsheets or other similar materials which are larger than 8.5 inches by 11 inches. All files saved on the CD shall be in .pdf format. A hard copy of any oversized maps, drawings, spreadsheets etc. in the PCN package shall be submitted and accompany the complete CD. An index or table of contents shall be provided and correspond with each file saved on the CD and/or within the PCN hard copy.

APPENDIX 1 TO REGIONAL GENERAL CONDITION 5 (a)		
County	**Waterway (aquatic species)**	**Township (semi-aquatic and terrestrial species)**
Adams	Ohio River, Scioto Brush Creek, South Fork Scioto Brush Creek	Sprigg
Ashtabula	Grand River, Pymatuning Creek	All townships
Athens	Ohio River	Alexander, Ames, Athens, Bern, Dover, Lee, Trimble, Waterloo, York
Brown	East Fork Little Miami River, Ohio River	Huntington
Butler	Great Miami River	
Champaign		Mad River, Salem, Urbana
Clark	Little Miami River	All townships
Clermont	East Fork Little Miami River, Little Miami River, Ohio	Miami, Pierce, Union
Clinton		Chester
Columbiana		Butler, Hanover
Coshocton	Killbuck Creek, Muskingum River, Walhonding River	
Crawford		Auburn, Bucyrus, Cranberry
Cuyahoga		Within 3 miles of the shore of Lake Erie in Brooklyn, Cleveland, Dover, East Cleveland, Euclid, Newburgh, Rockport, West Park

APPENDIX 1 TO REGIONAL GENERAL CONDITION 5 (a)		
Darke	Stillwater River	
Defiance	St. Joseph River	Milford
Delaware	Mill Creek, Olentangy River	
Erie		Margaretta; within 3 miles of the shore of Lake Erie in Berlin, Huron, Perkins, Sandusky, and Vermillion
Fairfield		Walnut
Fayette		Concord, Green, Jasper, Jefferson
Franklin	Big Darby Creek, Little Darby Creek, Scioto River	
Fulton	Swan Creek	
Gallia	Ohio River	
Greene	Little Miami River	Bath, Spring Valley
Hamilton	Great Miami River, Little Miami River, Ohio River	Colerain, Columbia, Crosby, Miami, Spencer, Sycamore, Symmes, Whitewater
Hancock	Blanchard River	
Hardin	Blanchard River	Blanchard, Hale, Jackson, Roundhead
Hocking		Benton, Green, Laurel, Marion, Starr, Ward, Washington
Holmes		All townships
Huron		New Haven, Richmond
Jackson		Liberty
Lake	Grand River	Within 3 miles of the shore of Lake Erie in Madison, Mentor, Painesville, Willoughby
Lawrence	Ohio River	Decatur, Rome, Union
Licking		Union
Logan	Great Miami River	Perry, Stokes, Zane
Lorain		Within 3 miles of the shore of Lake Erie in Amherst, Avon, Black River, Brownhelm, and Sheffield
Lucas	Swan Creek	All townships
Madison	Big Darby Creek, Little Darby Creek	
Mahoning		All townships
Marion	Tymochtee Creek	Big Island, Bowling Green, Grand, Montgomery, Salt Rock
Meigs	Ohio River	
Miami	Great Miami River, Stillwater River	

APPENDIX 1 TO REGIONAL GENERAL CONDITION 5 (a)		
Montgomery	Great Miami River, Stillwater River	Mad River
Morgan	Muskingum River	Deerfield, Homer, Malta, Marion, Penn, Union
Muskingum	Muskingum River	
Ottawa		All townships
Perry		Bearfield, Coal, Monroe, Pike, Pleasant, Salt Lick
Pickaway	Big Darby Creek, Scioto River	
Pike	Scioto River	
Portage		All townships
Preble		Gasper, Somers
Richland		Plymouth
Ross	Salt Creek, Scioto River	Colerain
Sandusky		All townships
Scioto	Ohio River, Scioto Brush Creek, Scioto River, South Fork Scioto Brush Creek	Nile, Rush, Union
Shelby	Great Miami River	
Summit		Tallmadge
Trumbull	Pymatuning Creek	All townships
Union	Big Darby Creek, Little Darby Creek, Mill Creek, Treacle Creek	
Vinton		Brown, Elk, Knox, Madison, Swan
Warren	Great Miami River, Little Miami River	Salem, Turtle Creek, Wayne
Washington	Muskingum River, Ohio River	
Wayne		All townships
Williams	Fish Creek, St. Joseph River	Bridgewater, Center, Florence, Jefferson, Madison, Northwest, St. Joseph, Superior
Wyandot	Tymochtee Creek	Marseilles, Mifflin, Pitt

General Limitations and Conditions for all Ohio EPA 401 Certified Nationwide Permits

A. CULVERTS

For intermittent and perennial streams:

1. When practicable, bottomless or buried culverts are required when culvert size is greater than 36” in diameter. This condition does not apply if the culverts have a gradient of greater than 1% grade or installed on bedrock. A buried culvert means that the bottom 10% by dimension shall be buried below the existing stream bed elevation.

2. The culvert shall be designed and sized to accommodate bankfull discharge and match the existing depth of flow to facilitate the passage of aquatic organisms.

3. When practicable, culverts shall be installed at the existing streambed slope, to allow for the natural movement of bedload and aquatic organisms.

B. BEST MANAGEMENT PRACTICES

1. Unless subject to a more specific storm water National Pollutant Discharge Elimination System (NPDES) permit, all best management practices for storm water management shall be designed and implemented in accordance with the most current edition of the NPDES construction general permit available at: http://www.epa.ohio.gov/dsw/storm/index.aspx, or any watershed specific construction general permit.

2. Sediment and erosion control measures and best management practices must be designed, installed, and maintained in effective operating condition at all times during construction activities as required by applicable NPDES permits. Proper maintenance ensures corrective measures will be implemented for failed controls within 48 hours of discovery.

3. For perennial and intermittent streams, in-stream sediment control measures shall not be utilized, with the exception of turbidity curtains parallel to the stream bank, for the purpose of sediment collection. All sediment and erosion control measures shall be entirely removed and the natural grade of the site restored once construction is completed.

4. All avoided water resources and associated buffers/riparian areas shall be demarcated in the field and protected with suitable materials (e.g., silt fencing, snow fencing, signage, etc.) prior to site disturbance. These materials shall remain in place and be maintained throughout the construction process and shall be entirely removed once construction is completed.

5. Disturbance and removal of vegetation from the project construction area is to be avoided where possible and minimized to the maximum extent practicable. Entry to surface waters shall be through a single point of access to the maximum extent practicable to minimize disturbance to riparian habitat. Unavoidable temporary impacts to forested riparian habitat shall be restored as soon as practicable after in-water work is complete using tree and shrub species native to the specific ecoregion where the project is located.

6. All dredged material placed at an upland site shall be controlled so that sediment runoff to adjacent surface waters is minimized to the maximum extent practicable.

7. Straw bales shall not be used as a form of sediment control unless used in

conjunction with another structural control such as silt fencing. Straw bales may be utilized for purposes of erosion control such as ditch checks.

8. Heavy equipment shall not be placed below the ordinary high water mark of any surface water, except when no other alternative is practicable.

9. Temporary fill for purposes of access or staging shall consist of suitable non-erodible material and shall be maintained to minimize erosion.

10. Chromated copper arsenate (CCA) and creosote treated lumber shall not be used in structures that come into contact with waters of the state.

11. All dewatering activities must be conducted in such a manner that does NOT result in a violation of water quality standards.

12. All areas of final grade must be protected from erosion within seven days.

13. All disturbed areas which remain dormant in excess of fourteen days must be protected from erosion within seven days from the last earth disturbing activity.

14. In the event of authorized in-stream activities, provisions must be established to redirect the stream flow around or through active areas of construction in a stabilized, non-erosive manner to the maximum extent possible.

C. MITIGATION

1. Compensatory mitigation is required for the discharge of dredged or fill material into wetlands for permanent impacts exceeding 0.10 acres.

2. When required, compensatory mitigation shall be provided in accordance with chapters 3745-1 and 3745-32 of the Ohio Administrative Code.

3. When compensatory mitigation will be provided wholly or in part at a mitigation bank or through an in-lieu fee program, credit purchase shall only be authorized at those banks or in-lieu fee programs approved by the Interagency Review Team (IRT) and have an active instrument signed by the director of Ohio EPA.

4. Compensatory mitigation for stream impacts, if required, shall be conducted in accordance with the requirements in the applicable Nationwide Permit.

D. DIRECTOR'S AUTHORIZATION

1. In accordance with the procedures outlined in Appendix A, Ohio EPA may grant coverage under this certification for any project that does not meet one or more of the terms and conditions for eligibility of this certification or where the district engineer has been granted authority to waive certain requirements. Coverage may be granted when Ohio EPA determines,

consistent with the special limitations and conditions for each certification, and after considering comments received on the requested director's authorization, that a project will have such a minimal impact on water quality that an individual 401 WQC is not necessary provided all other terms and conditions of this certification have been met. If a director's authorization is not granted, an individual 401 WQC must be obtained. In no case may a director's authorization issued under this certification exceed an impact threshold authorized by the Corps' Nationwide Permit.

E. NOTIFICATION TO OHIO EPA

1. For any activity proposed to be authorized under NWPs 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 18, 22, 23, 25, 27, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 45, 49, 51, 53, and 54, when a PCN is not required by the Corps, notification to Ohio EPA is required for impacts to the following resources:

a. category 3 wetlands;

b. ≥0.10 acres of wetland.

2. Notifications required by E.1 should contain all information required by Nationwide Permit General Condition 32(b) and (c), Regional General Condition 6, and Appendix B.

3. For any activity proposed to be authorized under NWPs 4, 6, 7, 12, 13, 14, 15, 16, 18, 22, 23, 25, 29, 30, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 45, 51, 53, and 54, when a PCN is not required by the Corps, notification to Ohio EPA is required for impacts to streams located in possibly eligible areas as depicted in the GIS NWPs Stream Eligibility Map.

4. Notifications required by E.3 should contain all information required by Nationwide Permit General Condition 32(b) and (c), Regional General Condition 6, and Appendix C.

5. When notification to Ohio EPA is required by conditions E.1 and E.3 above, the applicant shall not begin the activity until either:

a. He or she is notified in writing by Ohio EPA that the activity may proceed under the 401 WQC for the NWP; or

b. 45 calendar days have passed from Ohio EPA's receipt of the notification and the applicant has not received written notice from Ohio EPA that additional information is necessary or that an individual 401 WQC is required.

F. MISCELLANEOUS

1. Authorization under this certification does not relieve the certification holder from the responsibility of obtaining any other federal, state or local permits, approvals or authorizations.

2. For purposes of this certification the Corps' definition of single and complete linear and non-linear projects shall be applied to all conditions regarding impacts, mitigation, and director's authorizations. If a project includes impacts that are ineligible under this certification, an applicant must apply for an individual 401 WQC or a director's authorization for those impacts to resources that do not meet one or more of the terms and conditions within this certification.

3. For purposes of this certification temporary impact means temporary activities which facilitate the nature of the activity or aid in the access, staging, or development of construction that are short term in nature and which are expected, upon removal of the temporary impact, to result in the surface water returning to conditions which support pre-impact biological function with minimal or no human intervention within 12 months following the completion of the temporary impact. Examples of temporary impacts include, but are not limited to access roads, work pads, staging areas, and stream crossings, including utility corridors. Activities that result in a wetland conversion (e.g. forested to non-forested) are not considered temporary impacts.

4. In the event that the issuance of a nationwide permit by the Corps requires individual 401 WQC for an activity that constitutes an emergency as defined in 33 CFR 325.2(e)(4), the limitation and/or condition requiring the individual 401 WQC is not applicable and the project may proceed upon approval by the Corps provided all other terms of this certification, including mitigation, are met.

5. Representatives from Ohio EPA, Division of Surface Water will be allowed to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this certification. This includes, but is not limited to, access to and copies of any records that must be kept under the conditions of this certification; and, authorization to sample and/or monitor any discharge activity or mitigation site. Ohio EPA will make a reasonable attempt to notify the applicant of its intention to inspect the site in advance of that inspection.

6. Impacts as referenced in this certification consist of waters of the state directly impacted by the placement of fill or dredged material.

7. In accordance with the procedures outlined in Appendix B, and where specifically required in the special limitations and conditions of this certification, an applicant proposing to impact a wetland shall perform a wetland characterization analysis consistent with the Ohio Rapid Assessment Method (ORAM) to demonstrate wetland category for all projects requiring a PCN to the Corps or notification to Ohio EPA.

8. In accordance with the procedures outlined in Appendix C, and where specifically required in the special limitations and conditions of this certification, an applicant proposing to impact a stream shall determine the eligibility of the stream proposed for impact for all projects requiring a PCN to the Corps or notification to Ohio EPA.

Appendix A
Director's Authorization Process

1. To apply for a director's authorization for coverage under this certification, the applicant must provide to Ohio EPA the following:

   a. A completed Director's Authorization Request Form available on the "Director's Authorization" tab located at: http://www.epa.ohio.gov/dsw/401/permitting.aspx;

   b. A copy of the pre-construction notification submitted to the Corps including all attachments;

   c. A copy of the provisional nationwide permit authorization letter issued by the Corps including all attachments and special conditions, if any;

   d. A copy of the mitigation plan as approved by the Corps, if applicable;

   e. A detailed description of the conditions within this certification that are not being met;

   f. A detailed description of any NWP terms and conditions, including impact limits that the Corps district engineer has waived for the project, if applicable;

   g. A rationale of how the applicant believes the project will minimally impact water quality for those impacts to resources that do not meet one or more of the terms and conditions within this certification, including reason(s) why the resources are unable to be avoided;

   h. Comments received from the Ohio Department of Natural Resources and United States Fish and Wildlife Service regarding threatened and endangered species or comments from an applicant that has been authorized by these entities to make threatened and endangered species determinations;

   i. A one-time review fee of $2000 for the project;

   j. A detailed description of how the project meets public need, as defined in OAC 3745-1-50, for impacts to category 3 wetlands;

   k. Documentation as required under Appendix B and C;

   l. Any other documentation as may be required under this certification.

2. Upon receipt of the director's authorization request containing items a. through o. outlined above, excluding item c., the director will post the materials on the Ohio EPA, DSW webpage and invite public comment on the request for 15 days. The director will review and consider the comments received during the public comment period before making a decision on the director's authorization.

Appendix B
ORAM Verification Process

The ORAM results shall be included with the pre-construction notification (PCN) or notification to Ohio EPA if a PCN is not required by the Corps.

For each wetland proposed for impact the applicant must provide the following information for review in accordance with the ORAM verification procedure:

a. Complete ORAM forms prepared in accordance with the current ORAM manual;

b. Wetland delineation prepared in accordance with the current method required by the Corps;

c. A minimum of four high resolution color photographs taken while facing each of the four cardinal directions of each wetland proposed for impact. Photographs must accurately depict the quality of the wetland and may not include a majority of dying or dead vegetation or excessive cover due to seasonal conditions that vegetation and substrates cannot be observed, such as leaf litter, snow, or ice. Photographs deemed to be insufficient of representing the wetland will be required to be retaken once seasonal conditions are appropriate. Photographs shall be clearly labeled with the wetland name, direction, and date;

d. USGS topographical map, National Wetlands Inventory map, Soil Survey map and aerial images (both historical and current) which clearly outline the entire wetland boundary; and

e. Coordination letter from the Ohio Department of Natural Resources (ODNR), Natural Heritage Database indicating the presence or absence of state listed threatened or endangered species or comments from an applicant that has been authorized by ODNR to make threatened and endangered species determinations.

Appendix C
Stream Eligibility Determination Process

1. The stream eligibility results shall be included with the PCN or notification to Ohio EPA if a PCN is not required by the Corps. For each single and complete project with potential impacts to streams, where it is specifically required in the special limitations and conditions of this certification, the applicant shall determine if the streams proposed for impact are eligible for coverage under the 401 WQC for the Nationwide Permits using the following procedure:

   a. Navigate to the Ohio EPA 401 website at: http://www.epa.ohio.gov/dsw/401/permitting.aspx

   b. Click on the "Nationwide Permits" tab and then click on the "Stream Eligibility Web Map" link. To download the shapefile from the web map, click on the  in the upper right hand corner of the webpage and select download. To draw project boundaries directly on the web map, click on the  in the upper left hand corner of the webpage.

   c. Using a GIS program, overlay the project boundary, streams proposed for impact, current aerial imagery, and the stream eligibility layer. If the applicant does not have access to a

GIS program, the project boundary should be drawn on the web map and a copy of the map can be printed from the webpage;

i. If any stream proposed for impact within the project area falls within an ineligible area, impacts to that stream are not eligible for coverage under the 401 WQC for the Nationwide Permits, and the applicant shall apply for an individual 401 WQC or a director's authorization.

ii. If any stream proposed for impact within the project area falls within a possibly eligible area, the applicant shall take pH values, when applicable, and perform a Qualitative Assessment Habitat Evaluation Index (QHEI) or Headwater Habitat Evaluation Index (HHEI) assessment for the stream. Using the flow charts provided below, the applicant shall determine if impacts to that stream are eligible for coverage under the 401 WQC for the Nationwide Permits or if an individual 401 WQC is required.

iii. If all streams proposed for impact within the project area are located within the eligible area, impacts to that stream are eligible for coverage under the 401 WQC for the Nationwide Permits and no further assessment is necessary.

d. The applicant shall submit the following information with the PCN or notification to Ohio EPA:

i. Color map(s), no smaller than 8"x10", which clearly shows the project boundary, streams proposed for impact, current aerial imagery, and the stream eligibility GIS layer;

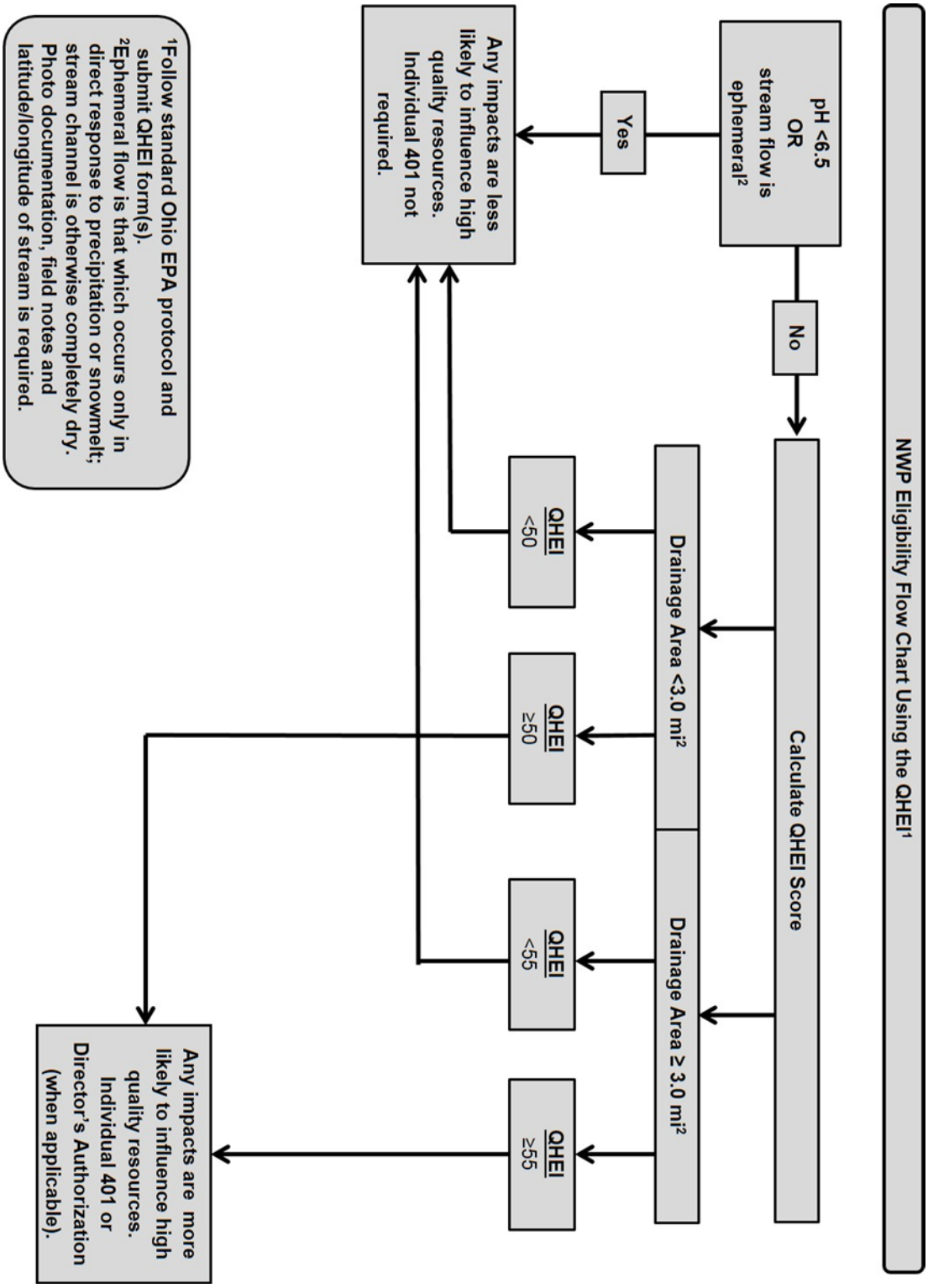
ii. For each stream located in possibly eligible areas;

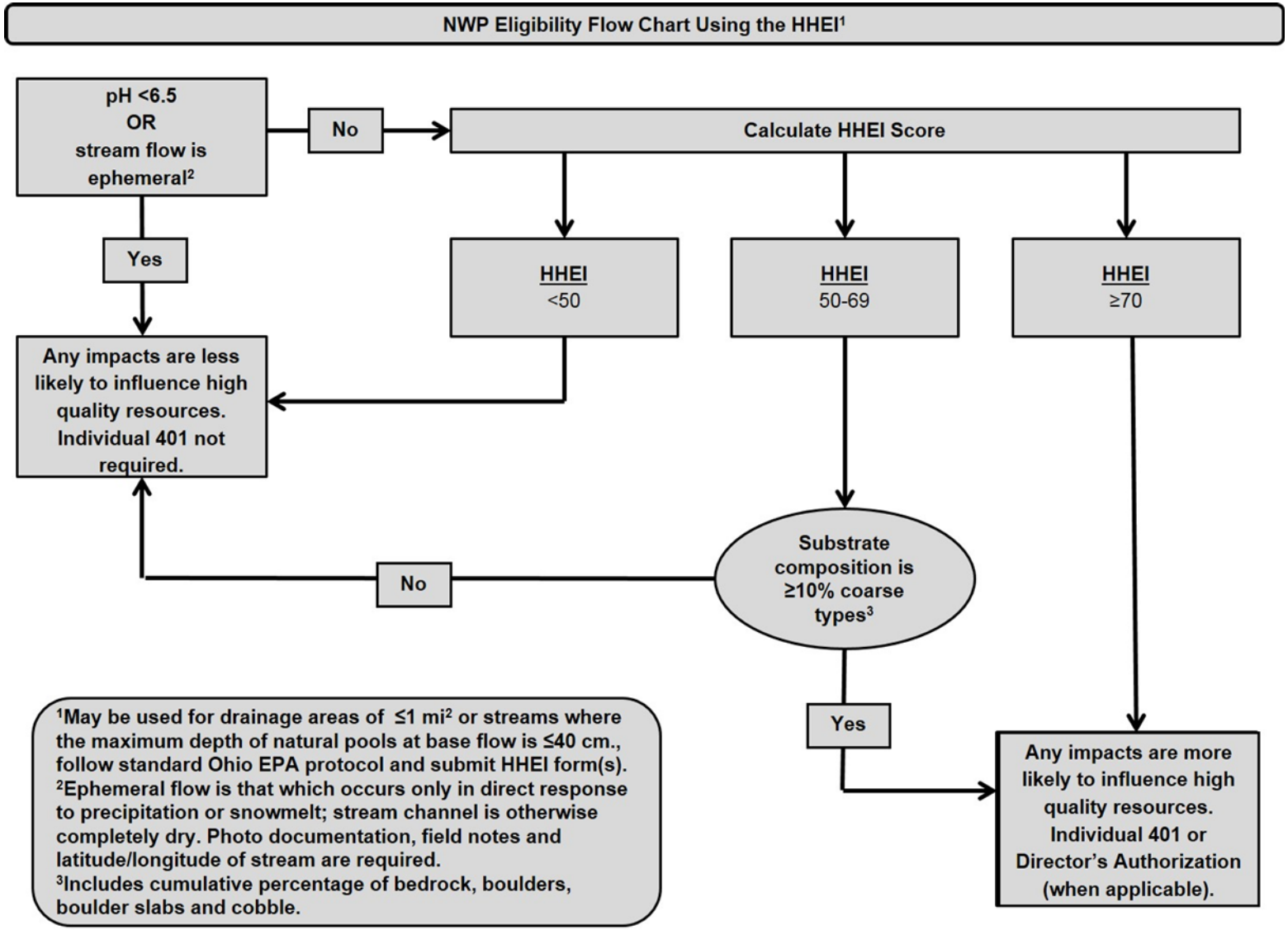
(1) A minimum of three high resolution color photographs taken of the proposed impact area, including one facing upstream, one facing downstream, and a close up which clearly depicts the substrate composition and size for each stream proposed for impact. Photographs must accurately depict the quality of the stream and may not include excessive cover due to seasonal conditions that substrates cannot be observed such as snow or ice. Photographs deemed to be insufficient of representing the stream will be required to be retaken once seasonal conditions are appropriate. Photographs shall be clearly labeled with the stream name, direction, and date;

(2) pH values for each stream proposed for impact taken within the proposed project area, where applicable;

(3) Complete QHEI or HHEI sheets prepared in accordance with the current manuals; and

(4) Statement of whether the streams proposed for impact within the project area are eligible for coverage under the 401 WQC for the Nationwide Permits or if an individual 401 WQC or a director's authorization is required.




NWP Eligibility Flow Chart Using the HHEI[1]
pH <6.5 OR stream flow is ephemeral[2]
No
Calculate HHEI Score
Yes
HHEI <50
HHEI 50-69
HHEI ≥70
Any impacts are less likely to influence high quality resources. Individual 401 not required.
Substrate composition is ≥10% coarse types[3]
No
Yes
Any impacts are more likely to influence high quality resources. Individual 401 or Director's Authorization (when applicable).
[1]May be used for drainage areas of ≤1 mi² or streams where the maximum depth of natural pools at base flow is ≤40 cm., follow standard Ohio EPA protocol and submit HHEI form(s).
[2]Ephemeral flow is that which occurs only in direct response to precipitation or snowmelt; stream channel is otherwise completely dry. Photo documentation, field notes and latitude/longitude of stream are required.
[3]Includes cumulative percentage of bedrock, boulders, boulder slabs and cobble.

H. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or

individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

OHIO ENVIRONMENTAL PROTECTION AGENCY DIVISION OF SURFACE WATER – NOTICE OF INTENT FOR COVERAGE UNDER OHIO ENVIRONMENTAL PROTECTION AGENCY GENERAL NPDES PERMIT

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

Dec 08, 2021

Cuyahoga County Department of Public Works
Lori Birschbach-Tober
2079 E. 9th Street
Cleveland, OH 44115

Re: Approval Under Ohio EPA National Pollutant Discharge Elimination System (NPDES) - Construction Site Stormwater General Permit - OHC000005

Dear Applicant,

Your NPDES Notice of Intent (NOI) application is approved for the following facility/site. Please use your Ohio EPA Facility Permit Number in all future correspondence.

Facility Name:	Cuy-Old Rockside Road Bridge 00.42
Facility Location:	Old Rockside Road over Cuyahoga River
City:	City of Independence
County:	Cuyahoga
Township:	
Ohio EPA Facility Permit Number:	3GC12643*AG
Permit Effective Date:	Dec 08, 2021

Please read and review the permit carefully. The permit contains requirements and prohibitions with which you must comply. Coverage under this permit will remain in effect until a renewal of the permit is issued by the Ohio EPA.

If more than one operator (defined in the permit) will be engaged at the site, each operator shall seek coverage under the general permit. Additional operator(s) shall submit a Co-Permittee NOI to be covered under this permit. There is no fee associated with the Co-Permittee NOI form.

Please be aware that this letter only authorizes discharges in accordance with the above referenced NPDES CGP. The placement to fill into regulated waters of the state may require a 401 Water Quality Certification and/or Isolated Wetlands Permit from Ohio EPA. Also, a Permit-To-Install (PTI) is required for the construction of sanitary or industrial wastewater collection, conveyance, storage, treatment, or disposal facility; unless a specific exemption by rule exists. Failure to obtain the required permits in advance is a violation of Ohio Revised Code 6111 and potentially subjects you to enforcement and civil penalties.

To view your electronic submissions and permits please Logon in to the Ohio EPA's eBusiness Center at http://ebiz.epa.ohio.gov.

If you need assistance or have questions please call (614) 644-2001 and ask for Construction Site Stormwater General Permit support or visit our website at http://www.epa.ohio.gov.

Sincerely,

Laurie A. Stevenson
Director

FLOODPLAIN DEVELOPMENT PERMIT

CITY OF INDEPENDENCE

CITY OF INDEPENDENCE, OH
6335 Selig Drive, Independence, OH 44131

Permit NO.: 2021-0074-ROW
Permit Type: **Right of Way**
Work Classification: **Road Open (FLOOD HAZARD)**
Permit Status: **Issued**
Issue Date: 09/16/2021 **Expiration: 09/16/2022**

Location Address

Old Rockside Road Bridge over Cuyahoga River

Contacts

City of Independence — **Owner**
6800 Brecksville RD, Independence, OH 44131

Description: Flood Hazard Permit.
Old Rockside Road Bridge over Cuyahoga River - Complete Bridge Replacement Project will be regraded and have slope protection added as shown on the plans.

Valuation: $0.00
Total Sq Feet: 0.00

Inspection Requests:
(216) 524-1374
engineering@independenceohio.org

Fees	Amount
Fee - Flood Hazard	$0.00
Total:	**$0.00**

Payments	Amt Paid
Total Fees	
Amount Due:	

Inspections:	
Inspection Type	
Engineering Site	
Final Engineering	

All work to be done according to the ordinances of the City of Independence, and the Laws of Ohio relating thereto; and on failure so to do, this permit may be revoked. If work authorized under this permit is not commenced within six (6) months after date of issue, this permit shall be void (per 1305.03 of the Codified Ordniances). For New Dwelling: Per Ordinance 1305-05 - All work including GRADING must be completed 1 year from Permit Issued Date; Per Ordinance 1305.06 - All LANDSCAPING must be completed within 18 months from Permit Issued Date.

Don Ramm - City Engineer

September 16, 2021
Date

FLOOD HAZARD AREA DEVELOPMENT PERMIT

This permit is issued based on documentation that the information provided in the Flood Hazard Development Permit Application is in compliance with the City of Independence (Community Name) Flood Damage Reduction Regulations.

Address or property location: Old Rockside Road Bridge (over Cuyahoga River)

Description of development activity: Complete bridge replacement project

The permittee understands and agrees that:

- An as-built Elevation Certificate will be submitted to the Floodplain Administrator after the first floor of a new, substantially improved, or substantially damaged, residential or non-residential structure is constructed;
- A final Letter of Map Revision will be obtained where a Conditional Letter of Map Revision was required as part of the permit application;
- The permit is issued on the representations made herein and on the application for permit;
- The permit may be revoked because of any breach of representation;
- Once a permit is revoked all work shall cease until the permit is reissued or a new permit is issued;
- The permit will not grant any right or privilege to erect any structure or use any premises described for any purposes or in any manner prohibited by the codes or regulations of the community;
- The permittee hereby gives consent to the Floodplain Administrator to enter and inspect activity covered under the provisions of the Floodplain Management Regulations;
- The permit form will be posted in a conspicuous place on the premises in plain view; and,
- The permit will expire if no work is commenced within one year of issuance.

Issued by: Donald J. Ramm
Floodplain Administrator

Date: 9/16/21

Permit Number: _____

FLOOD HAZARD AREA DEVELOPMENT PERMIT APPLICATION

Application is hereby made for a DEVELOPMENT PERMIT as required by the Special Purpose Flood Damage Reduction Regulations No. 1377 of the City of Indpendence for development in an identified flood hazard area. All activities shall be completed in accordance with the requirements of said regulations. The development to be performed is described below and in attachments hereto. The applicant understands and agrees that:

- The permit applied for, if granted, is issued on the representations made herein;
- Any permit issued may be revoked because of any breach of representation;
- Once a permit is revoked all work shall cease until the permit is reissued or a new permit is issued;
- Any permit issued on this application will not grant any right or privilege to erect any structure or sue any premises described for any purposes or in any manner prohibited by the ordinances, codes, or regulations of the municipality;
- The applicant hereby gives consent to the Floodplain Administrator to enter and inspect activity covered under the provisions of the floodplain regulations;
- If issued, the FHA Development Permit form will be posted in a conspicuous place on the premises in plain view; and,
- If issued, the permit will expire if no work is commenced within one year of issuance.

Owner's Name: City of Independence Builder/Developer: TBD

Address: 6335 Selig Dr, Independence, OH 44131 Address: TBD

Phone: 216-524-1374 Phone: TBD

LOCATION OF DEVELOPMENT SITE

1. Location of proposed development site address: Old Rockside Road Bridge over the Cuyahoga River
2. Legal description: Various

Attach a location map showing the location of the development site relative to adjacent sites. A location map may be a copy of the tax or plat map, including scale, showing the parcel where development activity will occur.

DESCRIPTION OF WORK

3a. Kind of development proposed (check all that apply):

- ☐ Residential structure
  - ☐ New structure
  - ☐ Addition to structure
  - ☐ Renovations/repairs/maintenance
  - ☐ Manufactured home installation
- ☐ Non-residential structure
  - ☐ New structure
  - ☐ Addition to structure
  - ☐ Renovations/repairs/maintenance
- ☐ Accessory structure: Dimensions:_____
- ☒ Filling or grading
- ☐ Dredging or excavation or mining
- ☐ Materials/equipment storage: Describe type _____
- ☒ Watercourse alteration (any change that occurs within the banks of a watercourse)
- ☐ Water supply / sewage disposal
- ☒ Bridge or culvert placement / replacement
- ☐ Subdivision greater than 50 lots or 5 acres
- ☐ Other development greater than 5 acres
- ☐ Other: _____

Additional activity description: Replacement of the Old Rockside Road Bridge over the Cuyahoga River. River banks will be regraded and have slope protection added as shown on the plans.

3b. If the proposed construction is an addition, renovation, repair or maintenance to an existing structure, indicate the cost of proposed construction $ N/A. What is the estimated market value of the existing structure $ N/A? [Complete Bridge Replacement]

NOTES AND ADDITIONAL SUBMITTAL REQUIREMENTS:

- *In addition to completion of this form the applicant agrees to submit any additional information required by the floodplain administrator in order to determine that the proposed development is compliant with the local and federal flood damage prevention criteria of the National Flood Insurance Program. Site plans for all development proposals must:*
  - *Be drawn to scale with north arrow.*
  - *Show property boundaries, floodway, and floodplain lines.*
  - *Show dimensions of the lot.*
  - *Show dimensions and location of existing and/or proposed development on the site.*
  - *Show areas to be cut and filled.*

- *Applications for residential and non-residential structures must also include:*
  - *The proposed lowest floor elevation based on the datum used on the effective Flood Insurance Rate Map and base flood elevation for the site.*
  - *Identification of whether the structure has a basement or enclosure below the lowest floor, and if it contains a basement or enclosure, detailed drawings showing foundation openings to allow passage of floodwaters.*
  - *Description of how building utilities will be protected from flood waters including drawings showing locations of such utilities.*
  - *Detailed description of anchoring system for all mobile and manufactured homes.*
  - *Description of construction materials that will be used below the flood protection elevation.*

- *An existing structure must comply with the flood protection standards if it is substantially improved (an improvement equal to or greater than 50% of the market value of the structure). The "substantial improvement" definition applies to existing structures only and that once a structure meets the definition of "new construction" any further improvements to that structure must meet "new construction" requirements. For floodplain management purposes "new construction" means structures for which "start of construction" began on or after the effective date of the initial Flood Insurance Rate Map issued by FEMA for the community.*

- *Any Pre-FIRM structure within the FHA that has sustained damage from any source (flood, fire, etc…) must be evaluated to determine if the structure is "substantially damaged" (damaged to 50% or more of the market value of the structure). If the structure is "substantially damaged, the structure must be brought into compliance with the flood protection standards.*

- *For subdivision proposals greater than 5 acres or 50 lots, or large-scale developments greater than 5 acres, a hydrologic and hydraulic analysis must be conducted to determine base flood elevations in flood hazard areas where no base flood elevations are provided.*

- *A Conditional Letter of Map Revision (CLOMR) must be obtained for proposed projects that would result in more than a 1.0 foot increase in BFE on a watercourse that has been studied through detailed hydrologic and hydraulic analyses where BFEs have been specified, but no floodway has been designated* ***OR*** *when a project proposed (totally or partially within the floodway) along a watercourse for which detailed analyses have been conducted and BFEs and a floodway have been designated would result in any (greater than 0.0 foot) increase in the BFE.*

- *Applications for non-residential structures proposed to be floodproofed must have a completed FEMA floodproofing certification form attached (can only be completed by a Registered Professional Engineer or Architect).*

- *All development proposals determined to be located in a floodway must be accompanied by a hydrologic and hydraulic analysis showing impacts on of the development on flood heights (can only be completed by a Registered Professional Engineer).*

- *Development proposals that are considered alterations of a watercourse must be accompanied by an analysis showing that the flood carrying capacity of the watercourse has not been reduced.*

I AGREE THAT ALL STATEMENTS IN AND ATTACHMENTS TO THIS APPLICATION ARE A TRUE DESCRIPTION OF THE EXISTING PROPERTY AND THE PROPOSED DEVELOPMENT ACTIVITY. I UNDERSTAND THE DEVELOPMENT REQUIREMENTS FOR SPECIAL FLOOD HAZARD AREA ACTIVITIES PER THE APPROPRIATE ORDINANCE OR RESOLUTION AND AGREE TO ABIDE THERETO. I UNDERSTAND IT IS MY RESPONSIBILITY TO OBTAIN ALL OTHER APPLICABLE FEDERAL, STATE AND LOCAL PERMITS.

Applicant's Signature: Jeffrey A Ackerman

Date: 3 / 3 / 2021

FLOOD HAZARD AREA DEVELOPMENT PERMIT
ADMINISTRATIVE CHECKLIST

NOTE: The following is to be completed by the local floodplain administrator. All references to elevations are in feet mean sea level (m.s.l.) according to the datum used on the effective Flood Insurance Rate Maps.

1. The proposed development is in:

X An identified floodway.
- Does a hydrologic and hydraulic engineering analysis accompany the application (Y) / N
- Does the analysis have a certification that flood heights will not be increased (Y) / N
- Is the analysis certified by a Registered Professional Engineer (Y) / N

___ A flood hazard area where base flood elevations exist with no identified floodway.
- Does a hydrologic and hydraulic engineering analysis accompany the application Y / N
- Does the analysis have a certification that flood heights will be increased less than the height designated in the community's flood damage reduction regulations (in no case will this be more than one foot) Y / N
- Is the analysis certified by a Registered Professional Engineer Y / N

___ An area within the floodplain fringe.

X An approximate flood hazard area (Zone A).

X Within the banks of a watercourse.
- Does an analysis demonstrating that the flood carrying capacity has not been diminished accompany the application (Y) / N

Base flood elevation (100-year) at proposed site 608.6 +/- feet m.s.l.
Data source NFIP FEMA Flood Insurance Rate Map
Map effective date December 3, 2010 Community-Panel No. 0194E

2. Does proposed development meet NFIP and local "Use and Development Standards" of your regulations?

X Permitted Use.

___ Water and wastewater systems standards met.

___ Subdivision standards met (All public utilities and facilities safe from flooding, adequate drainage, flood elevations generated where applicable.

___ Residential/non-residential structures standards met. Lowest floor elevation ___ feet m.s.l.
- Substantial Improvement / substantial damage Y / N
- Anchored properly (manufactured home affixed to permanent foundation) Y / N
- Utilities protected against flooding Y / N
- Construction materials below flood protection elevation resistant to flood damage Y / N
- Lowest floor elevated to or above flood protection elevation (BFE + freeboard) Y / N
- Has an enclosure below lowest floor (crawl space, walkout basement) Y / N
  - Enclosure have proper number and area of openings Y / N
  - Enclosure unfinished and only used for parking, materials storage or entry Y / N

___ Accessory structure standards met (square footage, use, foundation openings). Y / N

___ Recreational vehicle standards met.

___ Above ground gas or liquid storage tank anchored.

X Flood carrying capacity maintained for floodway development, areas where FEMA has provided BFE data but no floodways, or for alterations of a watercourse.

3. Does proposed development trigger requirement to submit a Letter of Map Revision or Conditional Letter of Map Revision? Y (N)

DECISION RECORD

4. The proposed development is in compliance with applicable floodplain standards. **FLOOD HAZARD AREA DEVELOPMENT PERMIT ISSUED ON** 9/16/21.

5. The proposed development is not in compliance with applicable floodplain standards. **FLOOD HAZARD AREA DEVELOPMENT PERMIT DENIED ON** ___. Reason(s):

___

6. The proposed development is exempt from the floodplain standards per Section ___ of the Flood Damage Prevention Ordinance (Resolution) No. ___.

Administrator's Signature: Donald J. Kamm Date: 9/16/21

FLOODPLAIN DEVELOPMENT PERMIT

VILLAGE OF VALLEY VIEW

VILLAGE OF VALLEY VIEW
FLOOD HAZARD AREA DEVELOPMENT PERMIT

This permit is issued based on documentation that the information provided in the Flood Hazard Development Permit Application is in compliance with the Village of Valley View Flood Damage Prevention Ordinance.

Permittee: City of Independence

Address or property location: Old Rockside Road over the Cuyahoga River

Description of development activity: Old Rockside Road Bridge over the Cuyahoga River

---

The Permittee understands and agrees that:

1.) The Village of Valley View has received a No-Rise Certification from a Registered Professional Engineer including bridge plans and hydraulic information that demonstrates that the proposed development would not result in any increase in the Base Flood Elevation.

2.) The applicant will provide the Village of Valley View a copy of the U.S. Army Corps of Engineers (USACE) a copy of the Section 408 permit as soon as it is available.

3.) The applicant shall comply with the standards and conditions for the Alteration of a Watercourse as required in Valley View Ordinance Section 1228.49.

4.) The applicant shall be responsible for providing the necessary maintenance for the altered or relocated portion of the Watercourse so the flood carrying capacity will not be diminished.

5.) The applicant shall provide the Village of Valley View a copy of the coverage for a storm water discharge permit associated with construction activity under the OHIO EPA NPDES General Permit before the start of construction activity.

6.) That the applicant shall comply with the State of Ohio Stormwater Discharge requirements. Soil erosion and sediment control best management practices shall be installed, maintained, and complied with during the permit period. The soil erosion and sediment control best management practices shall be implemented before the start of embankment construction. The plan and implementation shall meet the standards and specifications of the Ohio Department of Natural Resources, Rainwater and Land Development Manual, Ohio' s Standards for Stormwater Management, Land Development, and Urban Stream Protection, latest edition. Silt fences or silt sock shall be used to confine any erodible material.

7.) Regular inspection and maintenance shall be provided for all erosion and sediment control practices. Permanent Records of Maintenance and inspections must be kept throughout the construction period. Inspections must be made a minimum of once every 7 days and immediately after storm events greater than 0.5 inches of rain in a 24-hour period. The owner shall provide the name of the inspector, major observations, date of inspections and corrective measures taken.

8.) That the construction site will be inspected monthly. Items of concern and areas that need to be addressed subsequent to these inspections shall be remedied within 10 days.

9.) The permit is issued on the representations made herein and on the application for permit.

10.) The permit may be revoked because of any breach of representation.

11.) Once a permit is revoked all work shall cease until the permit is reissued or a new permit is issued.

12.) The permit will not grant any right or privilege to erect any structure or use any premises described for any purposes or in any manner prohibited by the codes or regulations of the community.

13.) The permittee hereby gives consent to the Floodplain Administrator to enter and inspect activity covered under the provisions of the Floodplain Management Regulations.

14.) The permit form will be posted in a conspicuous place on the premises in plain view.

15.) The permit will expire if no work is commenced within one year of issuance.

16.) This permit shall not be assignable.

17.) The applicant accepts the permit as issued and agrees to comply with each and all of the conditions thereof and further agrees to indemnify, defend and save harmless the Village of Valley View from all claims, suits and actions of every name and description brought against the Village, its Council or any officer, agent or employee of the Village on account of the permit.

Issued by: Todd Sciarra Date: 3/15/21

Village of Valley View
Floodplain Administrator

CITY OF CLEVELAND, DIVISION OF WATER

- **LETTER OF APPROVAL, INCLUDING FEES FOR PROPOSED WORK**
- **STAMPED APPROVED PLANS**

City of Cleveland
Frank G. Jackson, Mayor

Department of Public Utilities
Division of Water
1201 Lakeside Avenue
Cleveland, Ohio 44114-1175
(216) 664-2444
www.clevelandwater.com

May 13, 2021

Tori Eldridge
Burgess & Niple, Inc.
100 W Erie Street
Painesville, Ohio 44077

Re: Old rockside Road Bridge – Village of Valley View and City Independence, OH
CWD Project # 11897

Dear Ms. Eldridge:

Cleveland Water's Engineering Section hereby approves the plans for the referenced project and has provided a stamped copy of the approved plans submitted. This approval only covers water mains. This letter or stamped plans do not constitute approval for any bypass plan, Suburban Water Renewal Program project approval, or City of Cleveland approval. Please note that project approval expires after one year, as indicated in the stamped plans that were provided. Please also note that any new water service proposed, excluding those specified in STD-011, must be applied for and approved separately.

The contractor must contact our Inspection and Enforcement Office at (216)-664-2342 to set up a pre-construction meeting and have all fees paid prior to beginning water work. Please call to schedule the meeting even if you have sent an email to a Division of Water representative. Have the above project number ready.

Please note that Ohio EPA (OEPA) and Cleveland Water lead rules now apply. This requires several adjustments to the way water work is performed. For work involving any main suspected to have lead service connections (this includes any main installed prior to 1955), and that will impact one or more connection, the following steps must be followed:

- 75 days in advance of construction, Cleveland Water must be notified that work will begin. Please provide the streets involved, limits, any additional premises that will have their service line depressurized by the work, as well as projected start and finish dates. Cleveland will collect addresses and send letters to all property owners and residents with active water accounts.
- All city side lead shall be removed. In addition, we are employing a pilot program to fund replacing customer side lead when found, as customer lead must be disturbed when replacing city side lead. For all CWD funded projects, please include replacement of 5% customer side connections in your bids. For suburban and other third party funded projects, you may replace them, or CWD will have our contactors perform the replacement.
- Any time a customer's lead line is disturbed (particularly but not limited to cutting the line) on any side, all lead in the connection on both sides must be removed before tying the customer back in. If lead is found prior to cutting the line, the line must be left in service or the customer must be left on

bypass until the lead is removed.

- To obtain permission to perform private work, CWD inspectors will reach out to effected customers and offer them an agreement to replace the connection. If and only if the customer does not agree to lead line replacement, the lead can be reconnected. However, prior to this, CWD must distribute filters to all effected customers.

Additionally, if any water main work would result in 100 or more connections losing water service or pressure for any amount of time, arrangements for temporary bypass must be made to maintain service.

Attached is a summary of water work taken from plans along with applicable Cleveland Water fees to be assessed to the contractor. If you have any questions, please contact me at (216)-664-2444 ext. 74632

Sincerely,



Cleveland Water

Cc: Permits & Sales
Hydraulics
Inspector Copy
Project File

VALID THROUGH 2021 5/13/2021

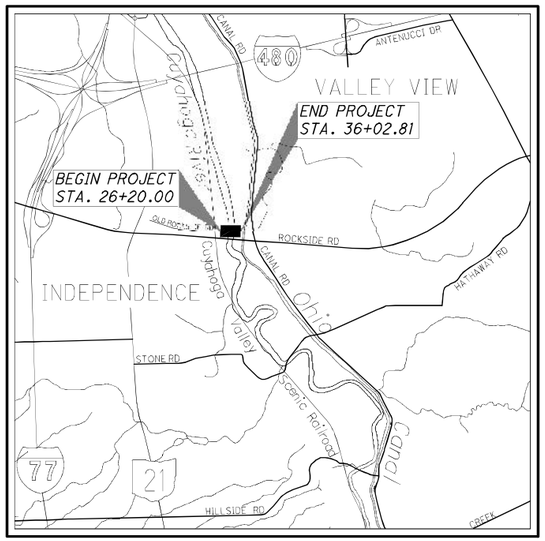
CHARGES FOR CWD PROJECT # 11897 Old Rockside Road

QUANTITY	UNITS	TYPE/LIMITS	RESPONSIBLE PARTY	FEE/UNIT	FEE
		INSTALL			
242	FEET	12" DUCTILE IRON WATER MAIN [Old Rockside Road]	BY CONTACTOR		
		DISINFECT			
242	FEET	12" DUCTILE IRON WATER MAIN [Old Rockside Road]	CWD LABOR	$ 1.05	$ 1,260.00
				SUBTOTAL	**$ 1,260.00**
2	OCCURRENCE	DISINFECTION SERVICE FEE [Old Rockside Road]		$ 400.00	$ 800.00
				DISINFECTION TOTAL	**$ 2,060.00**
		TAPS/RETAPS - BY CONTRACTOR/CWD LABOR			
				SUBTOTAL	**$ -**
		PLAN REVIEW			
242	FEET	PLAN REVIEW FEE (50 FOOT MINIMUM)	CWD LABOR	$ 1.00	$ 242.00
		AS BUILTS			
242	FEET	AS BUILT CONVERSION	CWD LABOR	$ 0.70	$ 169.40
		METERS (SUBDIVISIONS)			
		ACCOUNT SETUP FEE (SUBDIVISIONS)			

TOTAL FEE $ 2,471.40

Notes: *CWD fees are governed by Cleveland Codified Ordinance 535.06. Some of these fees change annually. The contractor will be required to pay the fee schedule that is in effect at the time of payment. Fees do not include retaps, as it is anticipated an approved contractor will self-perform all taps, or will install tees and valves for larger connections. If the contractor is not approved, or wishes to have CWD perform taps, please contact us for a revised quote. Disinfection Service fee is charged each time the disinfection crew has to set up its equipment/trip. If you exceed the number specified in this letter, there will be additional charges.*

CUYAHOGA COUNTY
CUY-OLD ROCKSIDE ROAD
REPLACEMENT OF EXISTING BRIDGE 00.42 OVER THE CUYAHOGA RIVER
VILLAGE OF VALLEY VIEW
CITY OF INDEPENDENCE
STATE OF OHIO



LOCATION MAP

LATITUDE: 41°23'41" N LONGITUDE: 81°37'45" W

SCALE IN MILES
0 1 2 3 4
N

PORTION TO BE IMPROVED
INTERSTATE HIGHWAY
FEDERAL ROUTES
STATE ROUTES
COUNTY & TOWNSHIP ROADS
OTHER ROADS

DESIGN DESIGNATION

CURRENT ADT (2022)	1800
DESIGN YEAR ADT (2042)	1800
DESIGN HOURLY VOLUME (2042)	180
DIRECTIONAL DISTRIBUTION	50
TRUCKS (24 HOUR B&C)	26%
DESIGN SPEED	30
LEGAL SPEED	25
DESIGN FUNCTIONAL CLASSIFICATION: LOCAL ROAD (URBAN)	
NHS PROJECT	NO

DESIGN EXCEPTIONS

NONE

UNDERGROUND UTILITIES
Contact Two Working Days Before You Dig
OHIO811.org Before You Dig
OHIO811, 8-1-1, or 1-800-362-2764
(Non-members must be called directly)

PLAN PREPARED BY:
BURGESS & NIPLE
100 WEST ERIE ST.
PAINESVILLE, OHIO 44077

ENGINEERS SEAL:
FOR STRUCTURES OVER 20' SPAN
SIGNED:
DATE:

ENGINEERS SEAL:
FOR ENTIRE PLAN EXCEPT STRUCTURES OVER 20' SPAN
SIGNED:
DATE:

PROJECT DESCRIPTION

REPLACEMENT OF THE OLD ROCKSIDE ROAD BRIDGE OVER THE CUYAHOGA RIVER. INCLUDES BRIDGE, ROAD, RECONSTRUCTION OF THE APPROACHES AND CONSTRUCTION OF A TEMPORARY BRIDGE.

EARTH DISTURBED AREAS

PROJECT EARTH DISTURBED AREA:	0.75 ACRES
ESTIMATED CONTRACTOR EARTH DISTURBED AREA:	1.04 ACRES
NOTICE OF INTENT EARTH DISTURBED AREA:	1.79 ACRES

2019 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REQUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT PROVISIONS FOR THE MAINTENANCE AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.

INDEX OF SHEETS:

TITLE SHEET	1	RETAINING WALL AND BARRIER MOMENT SLAB DETAILS	72-80
SCHEMATIC PLAN	2	STRUCTURES 20' & OVER TEMPORARY BRIDGE	81-98
TYPICAL SECTIONS	3-6	BRIDGE 00.42	99-142,111B,114A
GENERAL NOTES	7-13,13A	RIGHT OF WAY	143-157
MAINTENANCE OF TRAFFIC DETAILS	14-36	SOIL PROFILE	
GENERAL SUMMARY	37-39		
SUBSUMMARIES	40-45		
PROJECT SITE PLAN	46		
PLAN - OLD ROCKSIDE ROAD	47,50		
PROFILE - OLD ROCKSIDE ROAD	48,51		
PROFILE - CVSR DRIVE	49		
CROSS SECTIONS - OLD ROCKSIDE RD.	52-56		
CROSS SECTIONS - CVSR DRIVE	57-60		
DRIVEWAY PROFILES	61		
RESTORATION PLANS	62-63		
TRAFFIC CONTROL	64-66		
WATER WORK PLANS	67-71		

Approved
For water mains only
PROJECT # 11897
REVIEWER: Rasheed Warith
DATE: 05/13/2021
APPROVAL DOES NOT INCLUDE WATER SERVICE CONNECTIONS. APPROVAL DOES NOT INCLUDE CITY OF CLEVELAND OR OTHER MUNICPAL PERMITS APPROVAL EXIPRES AFTER ONE YEAR. CONTACT (216)664-2342 AT LEAST 7 DAYS PRIOR TO CONSTRUCTION. ALL WORK PERFORMED INCLUDES A 2 YEAR WARRENTY FROM THE DATE PUT INTO SERVICE.

FINAL SUBMITTAL APRIL 2021

SPECIAL PROVISIONS	
WATERWAY PERMIT FOR:	CUY - OLD ROCKSIDE ROAD
U.S. ARMY CORPS OF ENGINEERS PERMIT NO:	NATIONWIDE PERMIT NO. 3 (DA NO. XXXX-XXXX)
DATE:	XX/XX/XXXX

MICHAEL W. DEVER, M.P.A.
DIRECTOR OF PUBLIC WORKS

APPROVED _____
DIRECTOR OF PUBLIC WORKS DATE

ARMOND BUDISH
CUYAHOGA COUNTY EXECUTIVE

APPROVED _____
CUYAHOGA COUNTY EXECUTIVE DATE

OHIO DEPARTMENT OF TRANSPORTATION STANDARD CONSTRUCTION DRAWINGS

NUMBER	DATE	NUMBER	DATE	NUMBER	DATE	NUMBER	DATE
BP-3.1	1/17/20	RM-1.1	1/15/21	MT-101.70	1/17/20	AS-1-15	7/17/15
BP-3.2	1/18/19			MT-101.75	1/17/20	AS-2-15	1/18/19
BP-4.1	7/19/13	CB-1.1	7/19/19	MT-101.90	7/17/20	BR-2-15	7/17/15
BP-5.1	1/18/19	CB-2.2	1/15/21	MT-102.10	1/17/20	HW-2.1	7/20/18
BP-7.1	7/17/20	CB-2.3	1/15/16	MT-102.20	4/19/19	HW-2.2	7/20/18
		MH-1.1	1/15/16	MT-105.10	1/17/20	GSD-1-19	1/15/21
MGS-1.1	1/19/18	MH-1.2	1/15/16			PCB-91	7/17/20
MGS-2.1	1/19/18	DM-1.2	1/18/13	TC-41.20	10/18/13	SICD-1-96	7/18/14
MGS-3.1	1/19/18	DM-4.2	7/20/12	TC-41.30	10/18/13	SICD-2-14	1/15/21
MGS-3.2	1/18/13	DM-4.3	1/15/16	TC-42.10	10/18/13		
MGS-4.2	7/9/13	DM-4.4	1/15/16	TC-42.20	10/18/13		
MGS-4.3	1/18/13			TC-52.10	10/18/13		
MGS-5.2	7/15/16	MT-97.10	4/19/19	TC-52.20	1/15/21		
MGS-5.3	7/15/16	MT-97.11	1/20/17	TC-61.10	1/17/20		
MGS-6.1	1/19/18	MT-99.20	4/19/19	TC-61.30	7/19/19		
		MT-99.60	7/15/16	TC-71.10	1/19/18		

CUYAHOGA COUNTY ENGINEER CONSTRUCTION DRAWINGS

NUMBER	DATE
BP-4.1C	11/15/17
CB-3C	11/15/17
MD-1C	12/2/19
MD-5C	11/15/17
MH-10C	3/1/21
MH-11C	12/2/19
MKG-1C	1/26/04
CP-1C	2/13/13
BR-2-15C	12/7/16
PRF-1C	3/16/12

O.D.O.T. SUPPLEMENTAL SPECIFICATIONS

NUMBER	DATE
800	7/16/21
821	4/20/12
832	10/19/18
846	4/17/15
874	4/17/20
875	1/18/19
895	4/18/14
921	4/20/12
1055	4/18/08

SPECIAL PROVISIONS

SEE SECTION 200 OF THE CUYAHOGA COUNTY ENGINEER SPECIFICATION BOOKLET IN THE BID PACKAGE.

FEDERAL PROJECT NO. E120225
PID NO. 91563
CONSTRUCTION PROJECT NO.
RAILROAD INVOLVEMENT NONE
CUY - OLD ROCKSIDE ROAD
1 / 157

P:\PR57030\Cadd\Sheets\ORP_91563_GT001.dwg 05-May-21 3:20 PM

CALCULATED SAF
CHECKED JTP

WATER WORK GENERAL NOTES

CLEVELAND WATER DEPARTMENT GENERAL NOTES

CONTRACTORS ARE TO ABIDE BY THE MOST CURRENT VERSION OF THE CLEVELAND WATER NOTES AND DETAILS. THE MOST UP-TO-DATE VERSION CAN BE FOUND AT WWW.CLEVELANDWATER.COM/CONSTRUCTION/

GENERAL

1. ALL WATER WORK REQUIRED, WHETHER SHOWN ON THE PLANS, INCLUDED IN THE FOLLOWING NOTES, AS DIRECTED BY CLEVELAND WATER, OR AS DIRECTED BY THE PROJECT ENGINEER, SHALL BE INCLUDED IN THE ASSOCIATED WATER WORK PAY ITEMS INCLUDED IN THESE PLANS.

2. THE INFORMATION SHOWN ON THE CLEVELAND DIVISION OF WATER'S SUMMARY OF WORK/CHARGE LETTER, STRIP MAPS, AS BUILT DRAWINGS, GIS, AND THESE PLANS ARE TAKEN FROM EXISTING AVAILABLE RECORDS, AND THEIR ACCURACY IS NOT GUARANTEED.

3. CALL THE INSPECTION AND ENFORCEMENT UNIT AT 216-664-2342 TO SCHEDULE A PRE-CONSTRUCTION MEETING AT LEAST ONE WEEK PRIOR TO STARTING WATER MAIN CONSTRUCTION. THE OPERATION OF ANY VALVE OR ALTERATION OF ANY PART OF THE WATER SYSTEM BY CONTRACTORS OR THEIR EMPLOYEES IS PROHIBITED WITHOUT THE SUPERVISION OF THE CLEVELAND DIVISION OF WATER INSPECTOR.

4. PRIOR TO REQUESTING CHLORINATION, THE CONTRACTOR SHALL SUPPLY THE CLEVELAND WATER INSPECTOR WITH REDLINE DRAWINGS SHOWING CHANGES MADE FROM THE APPROVED DESIGN DRAWINGS AND ACTUAL MEASUREMENTS. CHLORINATION SHALL NOT OCCUR BEFORE THESE DRAWINGS ARE SUBMITTED.

5. FOR THE PURPOSES OF CHLORINATION AND BACTERIOLOGICAL TESTING OF THE WATER MAINS THE CONTRACTOR SHALL PROVIDE AND INSTALL, AT EACH OF THE CHLORINATION PIT LOCATIONS SHOWN AND AT OTHER LOCATIONS DETERMINED BY CLEVELAND WATER. FLUSHING / SAMPLING TAP SIZES ARE TO BE DETERMINED BY CLEVELAND WATER. CHLORINATION PITS SHALL BE SIX (6) FOOT SQUARE AND ARE TO MEET OSHA STANDARDS. NO CUSTOMER TAPS SHALL BE INSTALLED PRIOR TO CHLORINATION.

6. A TWO YEAR WARRANTY, COMMENCING FROM THE DATE OF ACCEPTANCE OF THE FINAL CHLORINATION OF THE WATER MAIN INSTALLATION SHALL BE PROVIDED BY THE CONTRACTOR FOR ALL WATER MAINS AND SERVICE CONNECTION WORK PERFORMED BY THE CONTRACTOR, INCLUDING TAPS IF PERFORMED. SHOULD ANY LEAKS OCCUR AND REPAIRS BE REQUIRED DUE TO DEFECTIVE MATERIAL OR POOR WORKMANSHIP. A LETTER INDICATING THE COMMENCEMENT DATE AND END DATE OF THE WARRANTY SHALL BE INCLUDE WITH THE AS-BUILT SUBMISSION IN NOTE 12.

7. USE BACKFILL MATERIAL AS SPECIFIED AND COMPACT SUFFICIENTLY IN THOSE AREAS WHERE EXISTING MAINS AND WATER SERVICE CONNECTIONS ARE EXPOSED. (SEE CLEVELAND WATER STANDARD DETAIL STD-001 ON FOLLOWING PAGE)

8. ALL MATERIALS, INCLUDING BUT NOT LIMITED TO WATER MAINS, FIRE HYDRANTS, VALVES, CONNECTION MATERIALS AND OTHER WATER APPURTENANCES, SHALL BE NEW AND UNUSED AND SHALL CONFORM TO THE MOST CURRENT CLEVELAND WATER SPECIFICATIONS. ALL MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH CLEVELAND WATER'S STANDARDS. ALL MATERIALS MUST MEET THE BUY AMERICA REQUIREMENT.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING WATER MAINS AND APPURTENANCES THEREOF WHEN CONSTRUCTING OR CONNECTING THE NEW WATER MAIN. THIS SHALL INCLUDE LEADED JOINTS IN EXISTING FITTINGS WHICH MAY REQUIRE REPLACEMENT FITTINGS AT THE DISCRETION OF THE INSPECTOR IF IT IS DETERMINED THEY WERE DISTURBED. ALL REPAIRS TO DAMAGED EXISTING FACILITIES SHALL BE MADE BY THE CONTRACTOR, AT THE PROJECT'S EXPENSE, TO THE SATISFACTION OF CLEVELAND WATER.

10. ALL HYDROSTATIC PRESSURE TESTING SHALL BE DONE BY THE CONTRACTOR IN THE PRESENCE OF THE CLEVELAND WATER INSPECTOR. THE HYDROSTATIC TEST PRESSURE SHALL BE 75 PSI ABOVE THE STATIC PRESSURE PREVAILING AT THE SITE, BUT IN NO CASE LESS THAN 150 PSI. THE PRESSURE TEST SHALL BE FOR A DURATION OF TWO (2) HOURS WITH THE PRESSURE BEING MAINTAINED WITHIN 5 PSI OF THE REQUIRED TEST PRESSURE. SHOULD THE PRESSURE TEST FAIL THE CONTRACTOR SHALL FIND AND CORRECT THE DEFICIENCY(IES) TO THE SATISFACTION OF CLEVELAND WATER AND REPEAT THE TWO (2) HOUR PRESSURE TEST.

11. ALL BURIED WATER MAINS, FITTINGS, VALVES, FIRE HYDRANT BRANCH PIPING AND APPURTENANCES SHALL BE ENCASED WITH POLYETHYLENE WRAPPING IN ACCORDANCE WITH THE MOST CURRENT REVISION OF ANSI/AWWA C-105/A21.5 INSTALLATION METHOD "A". ALTERNATE INSTALLATION METHOD A FOR WET TRENCH CONDITIONS SHALL BE USED WHEN WATER MAINS ARE INSTALLED IN UNPAVED LOCATIONS SUCH AS TREE LAWNS AND EASEMENTS TRAVERSING PRIVATE PROPERTY.

12. THE PROJECT'S PROFESSIONAL ENGINEER OR A DESIGNATED PROFESSIONAL SURVEYOR SHALL OBTAIN ACTUAL FIELD MEASUREMENTS OF THE MAIN DURING INSTALLATION AND SHALL FURNISH THE CLEVELAND WATER INSPECTOR WITH AS-BUILT DRAWINGS MEETING CLEVELAND WATER STANDARDS WITHIN 30 DAYS OF THE WATER MAIN GOING INTO SERVICE AND ALL TAPS/RETAPS BEING MADE. ONE HARD COPY AND ONE PDF COPY SHALL BE PROVIDED. DRAWINGS SHALL BE SIGNED, DATED, AND STAMPED WITH THE ENGINEER OR SURVEYOR'S SEAL. REDLINE DRAWINGS ARE NOT SUFFICIENT. CLEVELAND WATER RESERVES THE RIGHT TO WITHHOLD PAYMENT AND/OR APPROVAL OF FUTURE WORK IF AS-BUILTS ARE NOT SUBMITTED. THE COST OF RETAINING A PROFESSIONAL ENGINEER OR PROFESSIONAL SURVEYOR FOR THE WORK OUTLINED ABOVE AND THE COST TO PREPARE AND SUBMIT AS-BUILT DRAWINGS SHALL BE INCLUDED IN THE PERTINENT WATER ITEMS.

WATER MAINS

13. ALL PIPE, UNLESS OTHERWISE APPROVED BY CLEVELAND WATER, SHALL BE DUCTILE IRON, MINIMUM CLASS 52, CEMENT LINED HAVING PUSH-ON JOINTS WITH RADIALLY COMPRESSED RUBBER RING GASKET AND INSTALLED AS PER THE MOST CURRENT REVISION OF AWWA C600.

14. ALL FITTINGS, UNLESS OTHERWISE CALLED FOR, SHALL BE APPROVED DUCTILE IRON, CLASS 350, CEMENT LINED OR FUSION BONDED EPOXY COATED. ALL FITTINGS AND PIPE CONNECTED TO FITTINGS SHALL BE RESTRAINED USING A "RETAINED" MECHANICAL JOINT CONFORMING TO THE MATERIAL AND PERFORMANCE REQUIREMENTS OF ANSI/AWWA C-110/A21.10 AND ANSI/AWWA C-111/A21.11, OR "COMPACT" FITTINGS IN ACCORDANCE WITH ANSI/AWWA C-153/A21.53. EXCEPT FOR ANCHOR TEES, REDUCERS OR OTHER SPECIAL CIRCUMSTANCES WHEN BY CLEVELAND WATER, ALL FITTINGS ARE TO HAVE BELL ENDS.

15. ALL BOLTS AND NUTS ON ALL "RETAINED" MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING.

16. WHERE SHOWN ON THE PLANS, OR WHEN OTHERWISE CALLED FOR, PIPE AND FITTINGS SHALL HAVE AN APPROVED "TYPE I" OR "TYPE II" BOLTLESS RESTRAINED PUSH-ON JOINTS TO THE LIMITS SHOWN ON THE DRAWINGS.

17. AT THE END OF EACH WORKDAY, THE CONTRACTOR SHALL PLUG ALL OPEN PIPE ENDS WITH WATER TIGHT PLUGS AS PER THE "PREVENTITIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION" SECTION OF THE MOST CURRENT REVISION OF AWWA C-651 AS TO PREVENT THE INFILTRATION OR INTRUSION OF ANY FOREIGN OBJECTS OR MATERIALS. DATE STAMPED DIGITAL PHOTOS SHALL BE PROVIDED FOR EACH WORKDAY DEMONSTRATING THAT PROPER AWWA C-651 METHODS WERE USED TO PLUG ALL OPEN WATER MAIN ENDS. EACH PHOTO SHALL CLEARLY IDENTIFY THE STATION AT WHICH THE PIPE IS PLUGGED. THE STATIONING SHALL BE SHOWN BY THE USE OF A STATION MARKER PLACED AT THE PLUGGED PIPE END. PHOTOS SHALL BE SUBMITTED ON A DAILY BASIS UNLESS OTHERWISE DEFINED BY THE CLEVELAND WATER INSPECTOR OR ENGINEER. ALL PHOTOS TAKEN OVER THE COURSE OF THE PROJECT SHALL BE SUBMITTED BY THE CONTRACTOR AS PART OF THE AS-BUILT SUBMITTAL. PHOTOS ARE TO INCLUDE STATIONING MARKERS. AS-BUILTS SHALL BE DEEMED INCOMPLETE WITHOUT SAID COLLECTION OF DIGITAL PHOTOS.

HYDRANTS

18. IN ALL HYDRANT INSTALLATIONS THE CONTRACTOR SHALL FACE ALL HYDRANT'S 5" (STEAMER) NOZZLE TOWARD THE PAVEMENT PRIOR TO TESTING AND CHLORINATION OF WATER MAINS. ONLY CLEVELAND WATER APPROVED HYDRANT MODELS SHALL BE INSTALLED. CONTRACTOR SHALL CONSULT WITH THE LOCAL MUNICIPALITY'S ENGINEERING OR SERVICE DEPARTMENT TO OBTAIN HYDRANT NOZZLE THREAD REQUIREMENTS IF NOT INDICATED ON THE APPROVED PLANS.

VALVES

19. ALL VALVES SHALL BE AN APPROVED MODEL RESILIENT SEATED GATE VALVES AS PER THE MOST CURRENT VERSION OF AWWA C509 OR C515. VALVE OPERATING NUTS SHALL BE TAPERED (1 7/8" TO 2" FROM TOP TO BOTTOM) AND 2" DEEP. VALVES MORE THAN 10 YEARS OLD AT TIE IN POINTS TO EXISTING MAINS SHALL BE REPLACED AT THE PROJECT'S EXPENSE UNLESS OTHERWISE DIRECTED.

SERVICE CONNECTIONS

20. ANY CITYSIDE LEAD SERVICE CONNECTION ENCOUNTERED SHALL BE REPLACED WITH TYPE K COPPER OR OTHER APPROVED MATERIAL. IF OWNERSIDE LEAD WILL REMAIN, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY CLEVELAND WATER DEPARTMENT BY CALLING 216-664-2882 AND LEAVING A CLEVELAND WATER DEPARTMENT SUPPLIED CUSTOMER NOTIFICATION DOOR-HANGER ON ALL ACCESSIBLE POINTS OF ENTRY TO THE HOME.

21. AS PART OF THE AS BUILT SUBMISSION IN NOTE 12, THE CONTRACTOR SHALL PROVIDE A TABLE SHOWING ALL EXISTING CONNECTIONS, IDENTIFIED BY CLEVELAND WATER CONNECTION NUMBER, SHOWING THE FOUND CONNECTION MATERIAL FOR BOTH THE CITYSIDE AND OWNERSIDE CONNECTION, AS WELL AS THE NEW CONNECTION MATERIAL FOR ALL CONNECTIONS REPLACED. THE TABLE SHALL ALSO NOTE ANY REVISED CONNECTION MEASUREMENTS AND SIZES. A SAMPLE TABLE WILL BE PROVIDED. THE SUBMISSION SHALL BE IN MICROSOFT EXCEL FORMAT. CLEVELAND WATER SHALL REQUIRE THE DELIVERY AND ACCEPTANCE OF THIS TABLE BEFORE THE PRESSURE TEST AND CHLORINATION / DISINFECTION OF THE MAIN WILL BE PERMITTED.

22. NEW WATER SERVICE CONNECTIONS LOCATIONS, IF ANY, SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY AND ARE NOT PART OF THE WATER MAIN APPROVAL. THE SPECIFIC LOCATION FOR EACH CONNECTION WILL BE DETERMINED BY CLEVELAND WATER PRIOR TO THE TAPS BEING INSTALLED. ALL PERMITS FOR TAPS AND METERS FOR PARCELS ASSOCIATED WITH THE WATER MAINS INSTALLED ON THIS PROJECT ARE TO BE OBTAINED BY THE LAND OWNER OF SAID IMPROVEMENT PLANS. IT IS THE LAND OWNERS RESPONSIBILITY TO ARRANGE FOR OBTAINING PERMITS FOR ALL WATER SERVICE CONNECTIONS BEFORE ANY SERVICE CONNECTION WORK MAY PROCEED. ALL FEES CAN BE OBTAINED FROM THE CLEVELAND WATER PERMITS AND SALES SECTION AT 216-664-3130, PROMPT #7 OR 216-664-2444 X75209.

ACCOUNTS SHALL BE INITIATED IN THE LAND OWNER'S NAME AS PART OF THE PERMITTING PROCESS. ALL RESPONSIBILITIES ASSOCIATED WITH EACH WATER SERVICE, INCLUDING, THE OWNER SIDE INSPECTIONS, METER SET / METER PIPING INSPECTION AND THE METER INSTALLATION SHALL BE THE RESPONSIBILITY OF SAID OWNER.

METERS INSTALLATIONS WILL NOT BE AUTHORIZED TO BE INSTALLED UNTIL ALL INSPECTIONS HAVE BEEN COMPLETED. ESTIMATED BILLS MAY ENSUE IF A HOME IS IDENTIFIED AS HAVING WATER SERVICE BUT NO METER HAS BEEN INSTALLED. IF NEW OWNERS, ONCE PARCELS ARE SOLD OFF AND TRANSFER TITLE, DO NOT CONTACT CLEVELAND WATER TO ESTABLISH ACCOUNTS IN THEIR NAME, ACCOUNTS AND THEIR ASSOCIATED BILLS WILL REMAIN IN THE NAME OF OUR LAST OWNER OF RECORD WHICH MAY BE THE DEVELOPER OR BUILDER. IT IS THE RESPONSIBILITY OF THE NEW OWNER TO TRANSFER ACCOUNTS INTO THEIR NAME WHEN THE PROPERTIES LEGALLY TRANSFER. UPON TRANSFER OF PROPERTY, SELLER OF PROPERTY MUST COMMUNICATE ALL UNCOMPLETED PORTIONS OF THE REFERENCED RESPONSIBILITIES TO THE NEW OWNER.

23. ONE INCH SERVICE CONNECTIONS SHALL BE PERMITTED TO SERVICE NEW HOMES (AS SHOWN ON APPROVED WATER MAIN EXTENSION PLANS) BASED ON THE FOLLOWING CRITERIA:

- PEAK FLOW DEMANDS DO NOT EXCEED 25 GALLONS PER MINUTE FOR AN INDIVIDUAL HOME/UNIT. INCLUSIVE OF ALL USAGE (DOMESTIC AND/OR IRRIGATION),
- LENGTH OF ONE INCH CONNECTION DOES NOT EXCEED 75 FEET AS MEASURED FROM THE MAIN TO THE POINT OF ENTRY INTO THE PROPOSED HOME/UNIT.
- THE CONNECTIONS DO NOT INCLUDE LIMITED AREA OR NFPA (NATIONAL FIRE PROTECTION ASSOCIATION) 13D SPRINKLER SYSTEMS

ANY SERVICE REQUESTS DIFFERING FROM THE STATED CRITERIA SHALL REQUIRE THE SUBMITTAL OF A COMPLETE WATER SERVICE APPLICATION FOR EACH WATER SERVICE REQUESTED.

24. ALL CURB VALVE BOXES & METER VAULTS WILL BE INSTALLED IN GRASS AREAS WHEN POSSIBLE. CURB VALVES IN EASEMENTS SHALL BE PLACED APPROXIMATELY 3 FEET OFF THE WATER MAIN. IF VALVE BOXES OR METER VAULTS ARE INSTALLED OUTSIDE OF A DEDICATED RIGHT OF WAY OR EASEMENT FOR THE PURPOSES OF WATER SUPPLY, A STANDARD CLEVELAND EASEMENT FOR A VAULT SHALL BE PROVIDED.

EMERGENCIES

25. IF A WATER MAIN OR SERVICE CONNECTION BREAK OCCURS DURING CONSTRUCTION AND EMERGENCY ASSISTANCE IS REQUIRED, PLEASE NOTIFY CLEVELAND WATER AT 216-664-3060. THIS LINE IS AVAILABLE 24/7/365

CUY - OLD ROCKSIDE ROAD

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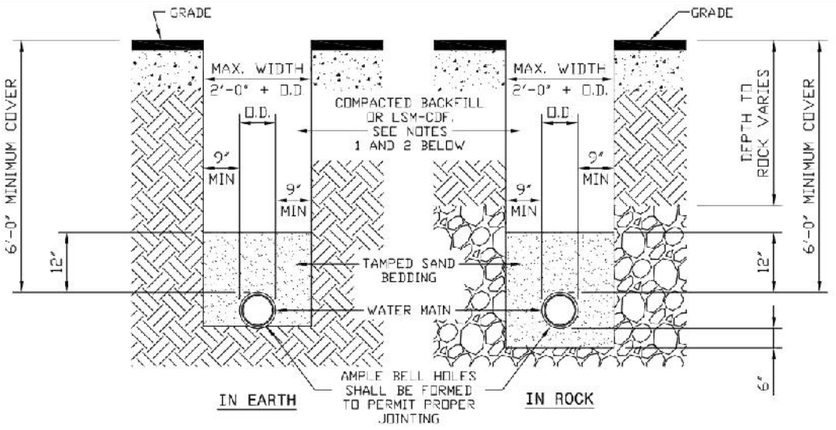
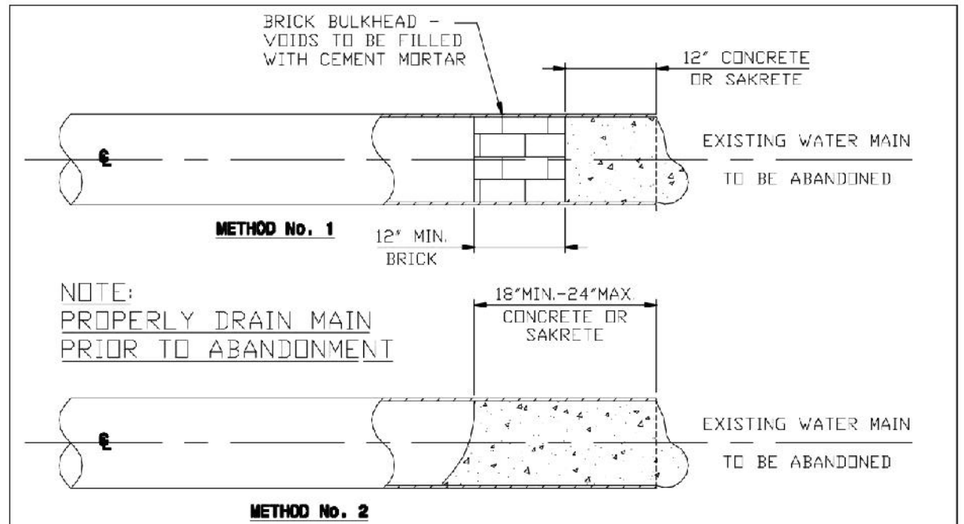


WATER MAIN TRENCH DETAILS

- NOT TO SCALE -

NOTES:
1) PREMIUM BACKFILL CONSISTING OF LOW STRENGTH MORTAR - CONTROLLED DENSITY FILL (LSM-CDF) "FLOWABLE FILL" IS REQUIRED:
   A) UNDER ALL EXISTING OR FUTURE PAVEMENTS, SIDEWALKS AND DRIVES WITHIN THE CITY OF CLEVELAND CORPORATION LIMITS.
   B) AS SPECIFIED IN LOCAL MUNICIPALITIES SERVED BY CWD (SEE LOCAL REQUIREMENTS)
2) WHEN PREMIUM BACKFILL IS REQUIRED BY THE LOCAL MUNICIPALITY FOR CASES OTHER THAN THOSE LISTED IN NOTE 1 ABOVE, IT SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.
3) CONTRACTOR SHALL USE SPECIAL CARE IN PLACING THE SAND BEDDING, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING SHALL BE TAMPED IN SIX (6) INCH LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.
4) MINIMUM COMPACTION FOR ALL SAND BEDDING, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.
5) PAVEMENT, SIDEWALK OR DRIVES TO BE INSTALLED IN ACCORDANCE WITH LOCAL MUNICIPALITY'S SPECIFICATIONS.

STD-001 | DATE: 6-21-2012



PLUGGING ABANDONED WATER MAIN ENDS

- NOT TO SCALE -

STD-004 | DATE: 10-1-97 | BY: RSK

"CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250 OR COMPRESSION COUPLINGS.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS, TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS, AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS.

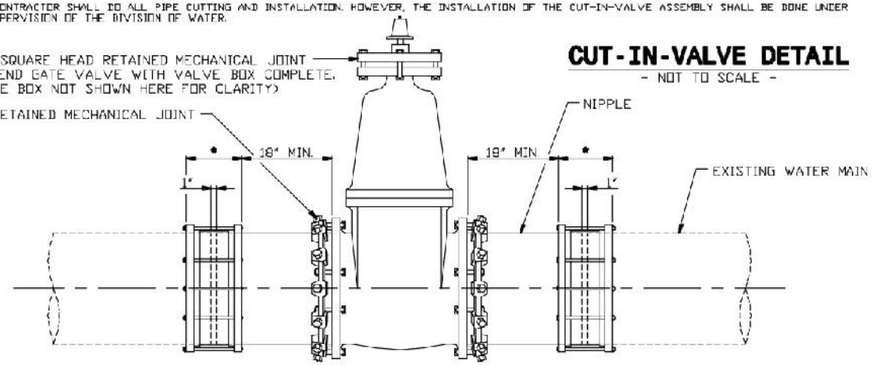
MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536).

THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 OR 162 (TRANSITION TYPE), OR SMITH-BLAIR 441 STRAIGHT AND TRANSITION COUPLINGS.

ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE "RETAINED" TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-99, CLASS "C", METHOD "B".

THE DIVISION OF WATER WILL DETERMINE THE FIELD LOCATION OF THE CUT-IN-VALVE ASSEMBLY. THE DIVISION OF WATER WILL ALSO SET THE TIME OF INSTALLATION OF THE CUT-IN-VALVE ASSEMBLY.

THE CONTRACTOR SHALL DO ALL PIPE CUTTING AND INSTALLATION. HOWEVER, THE INSTALLATION OF THE CUT-IN-VALVE ASSEMBLY SHALL BE DONE UNDER THE SUPERVISION OF THE DIVISION OF WATER.

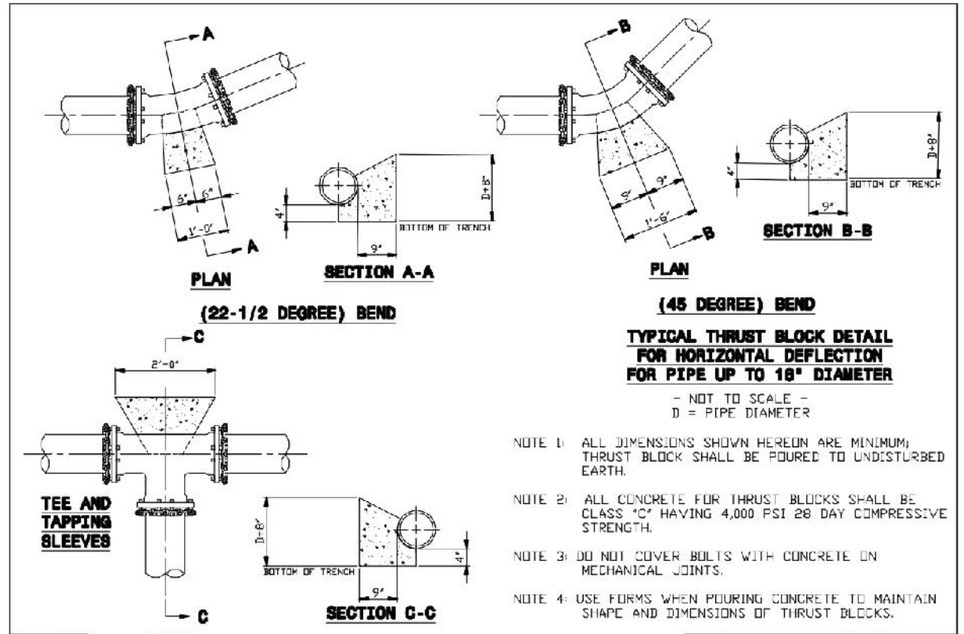


CUT-IN-VALVE DETAIL

- NOT TO SCALE -

NOTE:
BEFORE CUTTING EXISTING WATER MAIN, THE NIPPLES SHALL BE CONNECTED TO THE MECHANICAL JOINT BELL END GATE VALVE. AFTER CUTTING PIPE, FINAL CONNECTIONS SHALL BE MADE WITH COUPLINGS/SOLID SLEEVES AS SPECIFIED.

STD-005 | DATE: 10-1-97 | BY: RSK



TYPICAL THRUST BLOCK DETAIL FOR HORIZONTAL DEFLECTION FOR PIPE UP TO 18" DIAMETER

- NOT TO SCALE -
D = PIPE DIAMETER

NOTE 1: ALL DIMENSIONS SHOWN HEREON ARE MINIMUM; THRUST BLOCK SHALL BE POURED TO UNDISTURBED EARTH.

NOTE 2: ALL CONCRETE FOR THRUST BLOCKS SHALL BE CLASS "C" HAVING 4,000 PSI 28 DAY COMPRESSIVE STRENGTH.

NOTE 3: DO NOT COVER BOLTS WITH CONCRETE ON MECHANICAL JOINTS.

NOTE 4: USE FORMS WHEN POURING CONCRETE TO MAINTAIN SHAPE AND DIMENSIONS OF THRUST BLOCKS.

STD-006 | DATE: 1-15-98 | BY: RSK

CALCULATED SAF
CHECKED JTP

WATER WORK DETAILS

CUY - OLD ROCKSIDE ROAD

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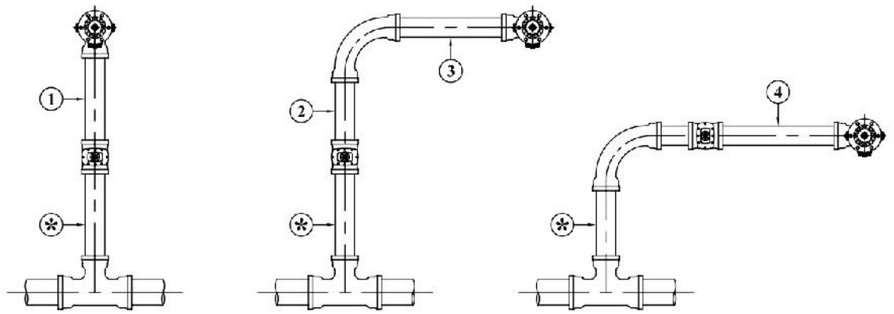
✻ IF CUTS ARE REQUIRED BETWEEN THE TEE AND VALVE, TOTAL REPLACEMENT WILL BE REQUIRED. SEE DETAILS STD-H06 STD-H07.

✻✻ IF EXISTING HYDRANT BRANCH VALVE IS 4" IN DIAMETER TOTAL REPLACEMENT WILL BE REQUIRED UNLESS SPECIFIC PERMISSION IS GRANTED BY THE DIVISION OF WATER ON A CASE BY CASE BASIS.

CUT AT	SEE DETAIL
①	STD H02 FOR STRAIGHT TYPE
②	STD-H03 FOR OFFSET TYPE 1
③	STD-H04 FOR OFFSET TYPE 2
④	STD-H05 FOR OFFSET TYPE 3
TOTAL REPLACEMENT	STD-H06 FOR STRAIGHT TYPE STD-H07 FOR OFFSET TYPE 1 & TYPE 2 & TYPE 3

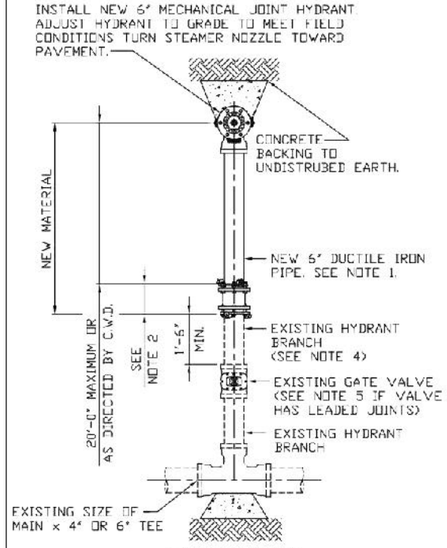


STRAIGHT TYPE OFFSET TYPE 1 & 2 OFFSET TYPE 3

DISTURBING EXISTING LEADED HYDRANTS AND LEADED FITTINGS

- NOT TO SCALE -

STD-H01 | DATE: 5-4-2006 | BY: RSK



STRAIGHT TYPE

1) PLAIN END x PLAIN END DUCTILE IRON PIPE AS SPECIFIED (CUT TO SUIT).

2) CONNECTION SHALL BE MADE WITH RETAINED MECHANICAL JOINT SOLID SLEEVES (SHORT OR LONG PATTERN) DUCTILE IRON CLASS 350 OR CAST IRON CLASS 250, RETAINED MECHANICAL JOINT REDUCERS WHERE EXISTING PIPE IS 4" IN DIAMETER, OR COMPRESSION COUPLINGS WITH ROD AND CLAMPS AS DIRECTED BY C.W.D. INSPECTOR.

COMPRESSION COUPLINGS SHALL BE OF A GASKETED, SLEEVE TYPE WITH DIAMETERS TO PROPERLY FIT PLAIN END IRON PIPE. EACH COUPLING SHALL CONSIST OF ONE (1) MIDDLE RING, WITHOUT STOPS; TWO (2) FOLLOWER GLANDS; TWO (2) RUBBER-COMPOUND BUNA-N BLEND, WEDGE SECTION GASKETS; AND SUFFICIENT TRACKHEAD STAINLESS STEEL BOLTS AND NUTS (ASTM A276/A193/194, TYPE 304, EXTRA HEAVY HEX) TO PROPERLY COMPRESS THE GASKETS. MIDDLE RING AND FOLLOWER GLANDS SHALL BE OF EITHER STEEL OR DUCTILE IRON (ASTM-A536). THE COMPRESSION COUPLING SHALL BE WITHOUT STOPS AND BE RATED FOR A MINIMUM WORKING PRESSURE OF 250 PSI AND SHALL BE EQUAL TO THE DRESSER STYLE No's 38, 138 (STRAIGHT TYPE), 162 (TRANSITION TYPE), 253 (REDUCING TYPE); OR SMITH-BLAIR 441 (STRAIGHT AND TRANSITION TYPE), R441 (REDUCING TYPE); OR ROMAC STYLE 501 (STRAIGHT AND TRANSITION TYPE), STYLE RC501 (REDUCING TYPE).

IF THE BRANCH IS TO BE SHORTENED, NO NEW IS PIPE REQUIRED.

3) ALL BOLTS AND NUTS ON ALL MECHANICAL JOINTS, INCLUDING THOSE ON THE "RETAINED" TYPE, SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINTING FOLLOWED BY AN ENCASEMENT OF POLYETHYLENE WRAPPING IN ACCORDANCE WITH ANSI/AWWA C-105/A21.5-88, CLASS "C", METHOD "B".

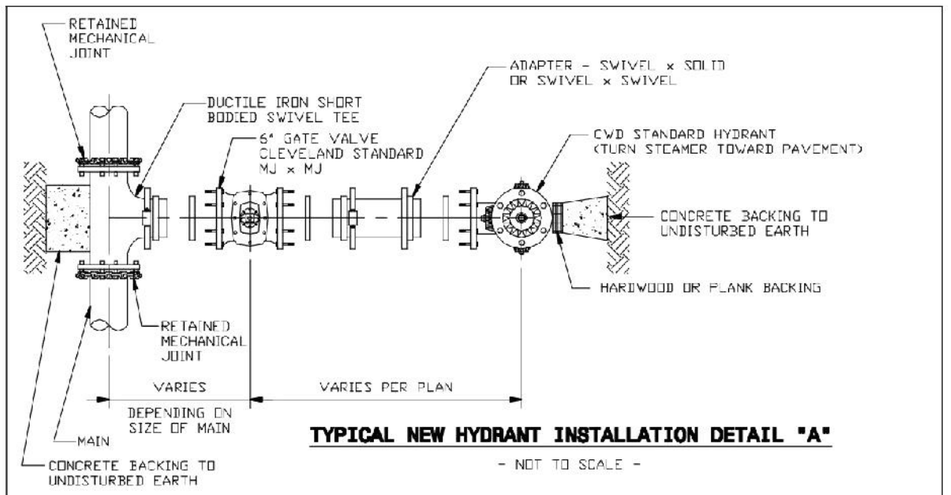
4) IF EXISTING PIPING IS 4" USE 4" TO 6" REDUCING MJ REDUCER OR REDUCING TRANSITION COUPLING WITH ROD & CLAMP IF APPROVED BY CWD.

5) IN HIGH PRESSURE AREAS THE EXISTING VALVE MAY NEED TO BE RESTRAINED TO EXISTING TEE OR FITTING USING ROD & CLAMP AS DIRECTED BY CWD. SEE STD-H01 FOR EXISTING LEAD JOINT REQUIREMENTS.

EXTEND, SHORTEN AND ADJUST HYDRANT TO GRADE, STRAIGHT TYPE

- NOT TO SCALE -

STD-H02 | DATE: 8-20-2012 | BY: RSK



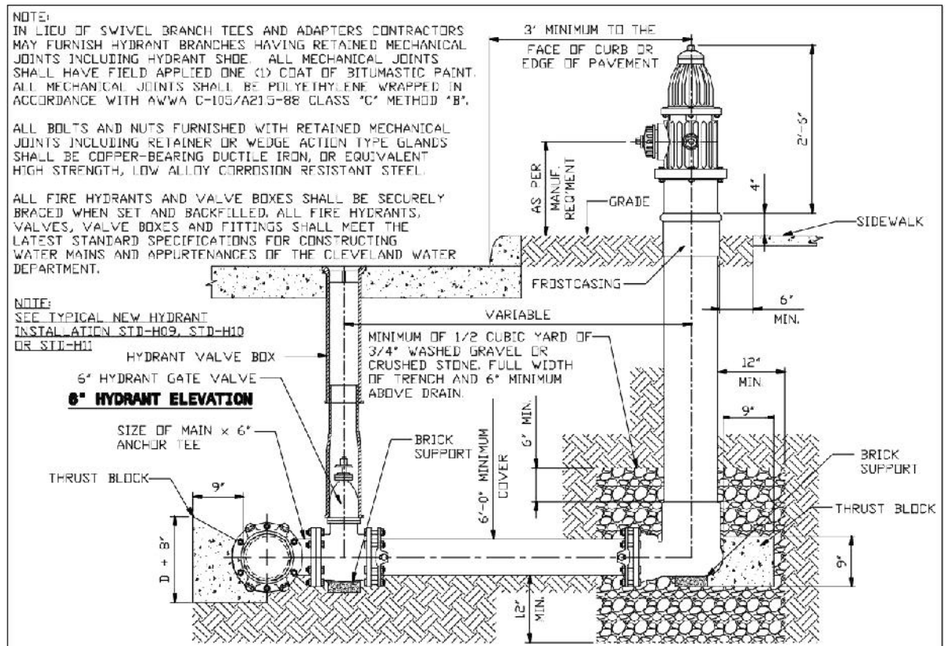
TYPICAL NEW HYDRANT INSTALLATION DETAIL "A"

- NOT TO SCALE -

NOTE: IN LIEU OF SWIVEL BRANCH TEES AND ADAPTERS CONTRACTORS MAY FURNISH HYDRANT BRANCHES HAVING RETAINED MECHANICAL JOINTS INCLUDING HYDRANT SHOE. ALL MECHANICAL JOINTS SHALL HAVE FIELD APPLIED ONE (1) COAT OF BITUMASTIC PAINT. ALL MECHANICAL JOINTS SHALL BE POLYETHYLENE WRAPPED IN ACCORDANCE WITH AWWA C-1-5/A21.5-88 CLASS "C" METHOD "B".

ALL BOLTS AND NUTS FURNISHED WITH RETAINED MECHANICAL JOINTS INCLUDING RETAINER OR WEDGE ACTION TYPE GLANDS SHALL BE COPPER-BEARING DUCTILE IRON, OR EQUIVALENT HIGH STRENGTH, LOW ALLOY CORROSION RESISTANT STEEL.

STD-H09 | DATE: 3-4-2002 | BY: RSK



STD-H13 | DATE: 2-23-2005 | BY: RSK

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WATER WORK DETAILS

CUY - OLD ROCKSIDE ROAD

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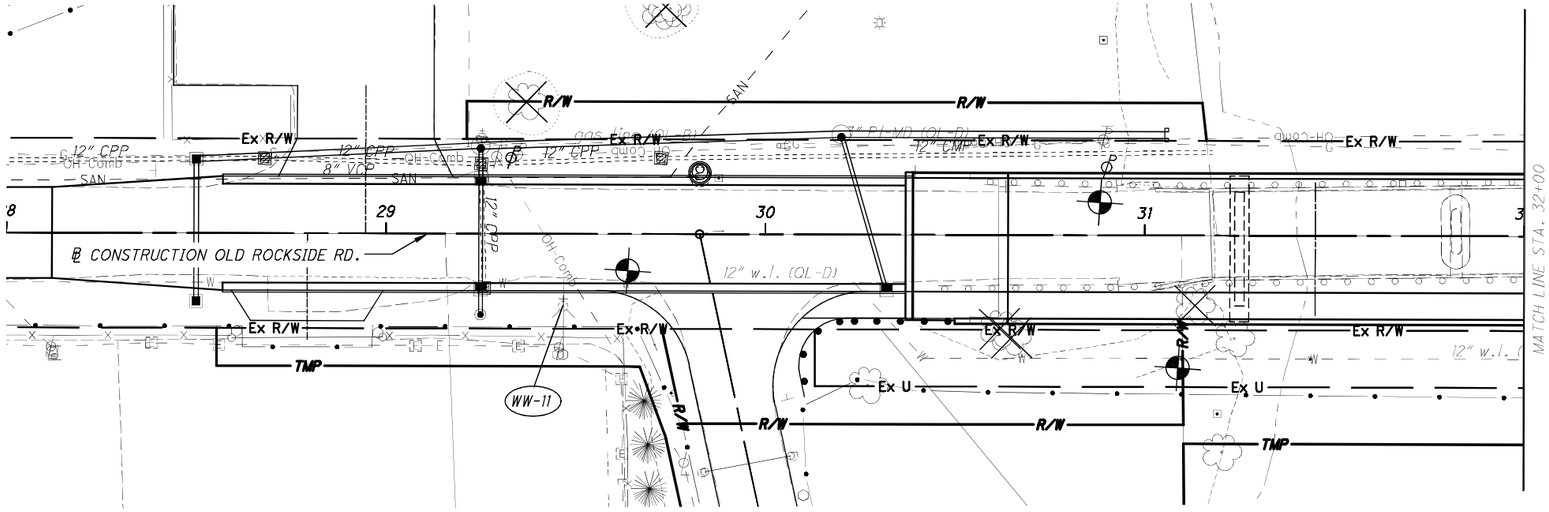
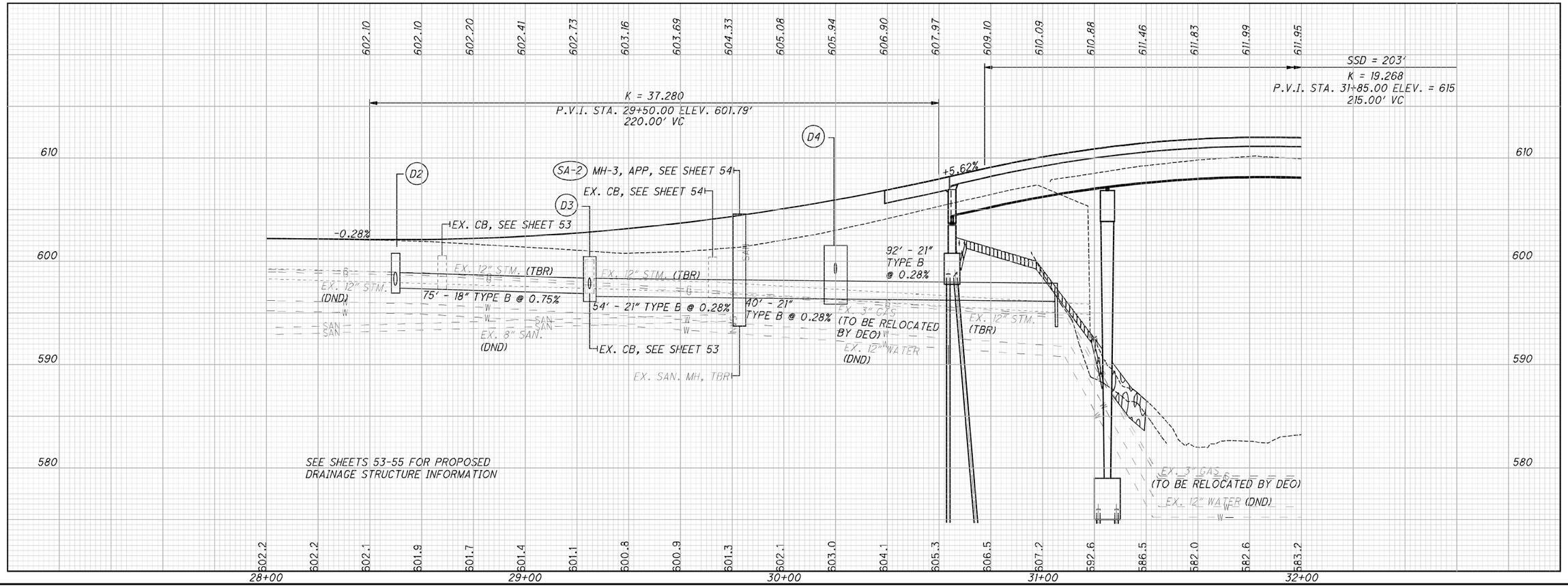


NOTE:
SEE SHEET 47 FOR DRAINAGE STRUCTURE CALL-OUTS



HORIZONTAL SCALE IN FEET
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WATER WORK PLAN AND PROFILE
STA. 28+00 TO 32+00
CUY - OLD ROCKSIDE ROAD

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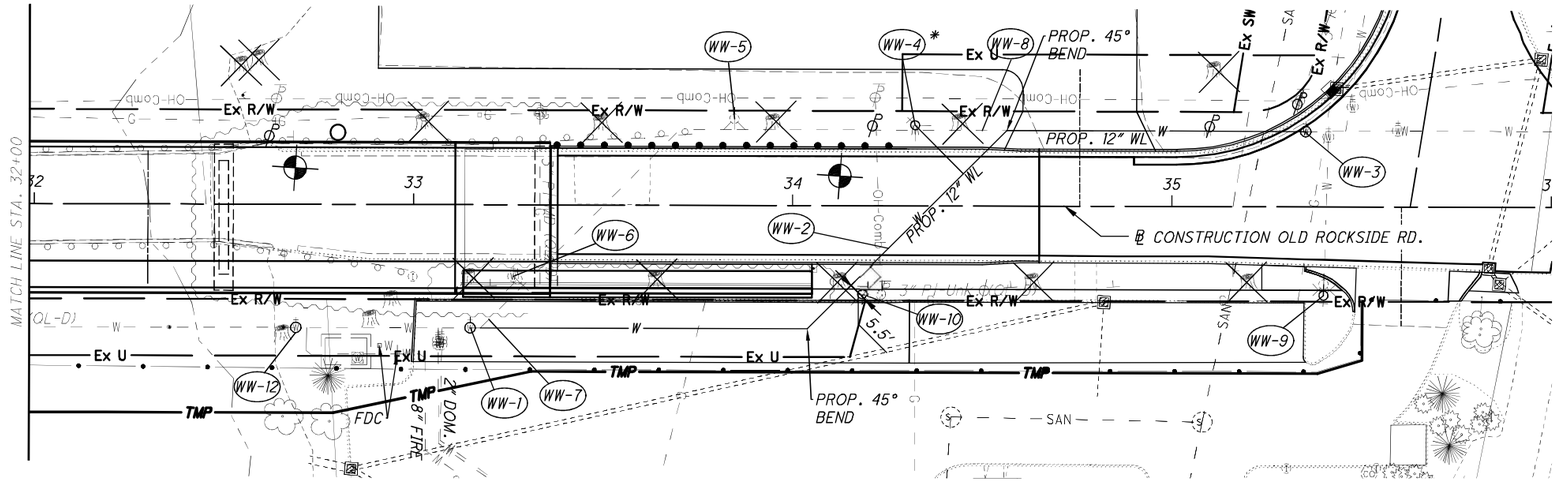
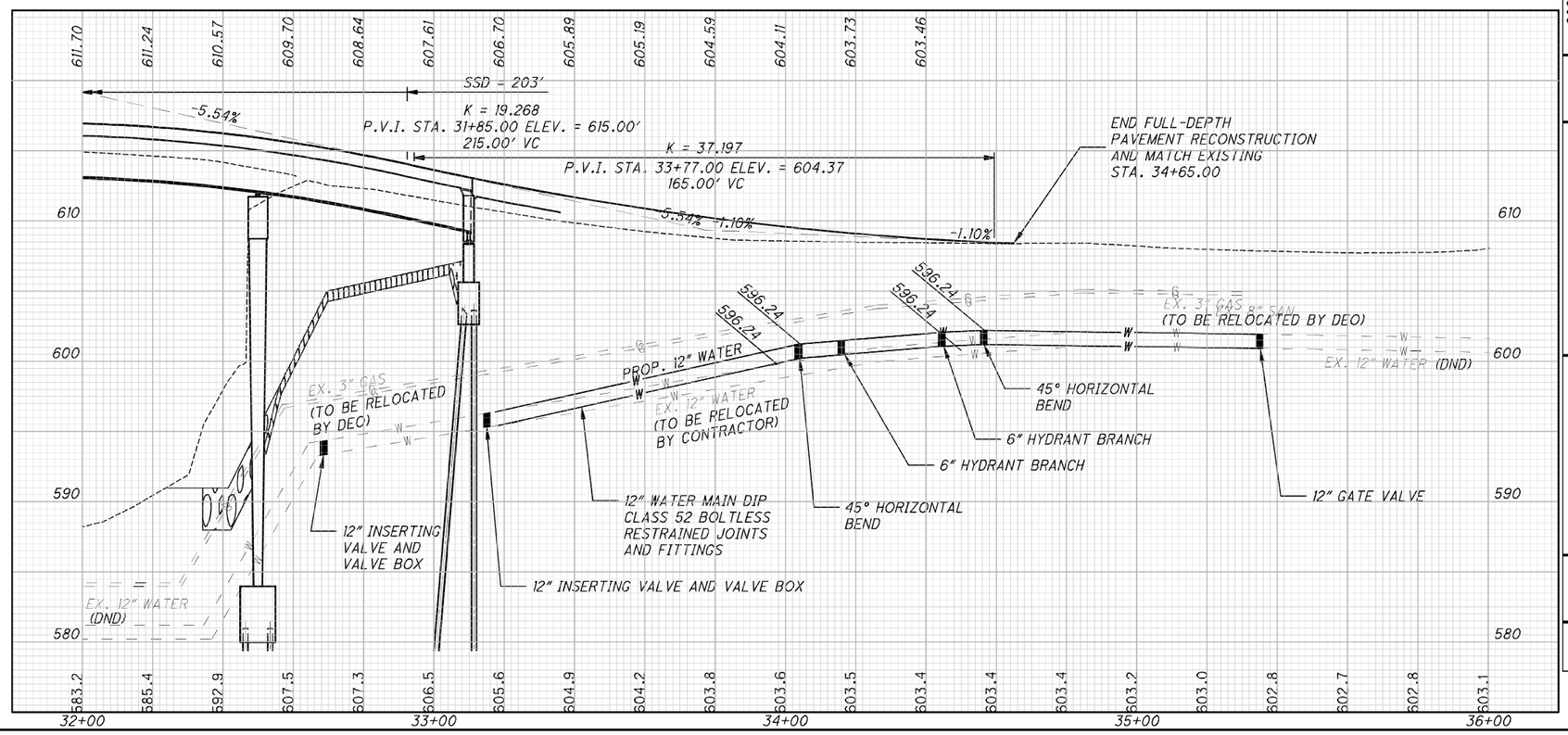
WATER APPURTENANCE SCHEDULE			
STATION	OFFSET	STREET	DESCRIPTION
32+69.00	32.50' RT	OLD ROCKSIDE RD.	12" INSERTING VALVE AND VALVE BOX
33+15.00	32.50' RT	OLD ROCKSIDE RD.	12" INSERTING VALVE AND VALVE BOX
34+04.00	32.50' RT	OLD ROCKSIDE RD.	12" 45° BEND
34+18.50	23.50' RT	OLD ROCKSIDE RD.	6" HYDRANT ASSEMBLY
34+32.27	21.23' LT	OLD ROCKSIDE RD.	6" HYDRANT ASSEMBLY
34+56.43	19.93' LT	OLD ROCKSIDE RD.	12" 45° BEND
35+35.24	19.84' LT	OLD ROCKSIDE RD.	12" GATE VALVE

NOTES:
1. CONTRACTOR SHALL INSTALL HYDRANTS WW-9 AND WW-10 SUCH THAT THE NOZZLES ARE WITHIN THE RIGHT OF WAY AND DO NOT ENCROACH ON THE SIDEWALK

2.SEE SHEET 50 FOR DRAINAGE STRUCTURE CALL-OUTS

*SEQUENCE OF CONSTRUCTION NOTE:
HYDRANT TO BE SET DURING PHASE 3





SHEET NO.	REFERENCE NO.	LOCATION	STATION FROM	STATION TO	SIDE	202 VALVE BOX REMOVED	638 SPECIAL - CUT AND PLUG EXISTING 12" WATER LINE	638 SPECIAL - 6" FIRE HYDRANT FURNISHING AND SETTING, COMPLETE	638 SPECIAL - 12" WATER MAIN DIP CLASS 52 BOLTLESS RESTRAINED JOINTS AND FITTINGS	638 FIRE HYDRANT REMOVED AND DISPOSED OF	638 FIRE HYDRANT ADJUSTED TO GRADE	638 FIRE HYDRANT EXTENDED AND ADJUSTED TO GRADE	638 12" INSERTING VALVE AND VALVE BOX	638 12" GATE VALVE
						EACH	EACH	EACH	FT	EACH	EACH	EACH	EACH	EACH
71	WW-1	OLD ROCKSIDE ROAD	33+15.00		RT.								1	
71	WW-2	OLD ROCKSIDE ROAD	33+17.78	35+35.28	LT./RT.									1
71	WW-3	OLD ROCKSIDE ROAD	35+35.28		LT.	1								
71	WW-4	OLD ROCKSIDE ROAD	34+32.17		LT.			1		1				
71	WW-5	OLD ROCKSIDE ROAD	33+84.60		LT.		1				1			
71	WW-6	OLD ROCKSIDE ROAD	33+27.48		RT.								1	
71	WW-7	OLD ROCKSIDE ROAD	33+20.00		RT.									1
71	WW-8	OLD ROCKSIDE ROAD	34+50.00		LT.			1	240	1				
71	WW-9	OLD ROCKSIDE ROAD	35+40.00		23.5' RT.						1			
71	WW-10	OLD ROCKSIDE ROAD	34+15.50		RT.			1				1		
70	WW-11	OLD ROCKSIDE ROAD	29+46.84		LT.		1							
71	WW-12	OLD ROCKSIDE ROAD	32+69.00		RT.		1							
		TOTALS CARRIED TO GENERAL SUMMARY				1	2	2	240	2	1	1	2	1

N

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CHECKED JTP

WATER WORK PLAN AND PROFILE
STA. 32+00 TO 36+00

CUY - OLD ROCKSIDE ROAD

71
157

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SECTION 300

SUPPLEMENTAL SPECIFICATIONS

- SS 800 – Revisions to the 2019 Construction & Material Specifications (dated 07/16/2021)
- SS 821 – Revisions to the 2019 Construction & Material Specifications (dated 04/20/2012)
- SS 832 – Revisions to the 2019 Construction & Material Specifications (dated 10/19/2018)
- SS 846 – Revisions to the 2019 Construction & Material Specifications (dated 04/17/2015)
- SS 874 – Revisions to the 2019 Construction & Material Specifications (dated 04/17/2020)
- SS 875 – Revisions to the 2019 Construction & Material Specifications (dated 01/18/2019)
- SS 895 – Revisions to the 2019 Construction & Material Specifications (dated 04/18/2014)
- SS 921 – Revisions to the 2019 Construction & Material Specifications (dated 04/20/2012)
- SS 1055 – Revisions to the 2019 Construction & Material Specifications (dated 10/19/2018)

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 800
REVISIONS TO THE 2019 CONSTRUCTION & MATERIAL SPECIFICATIONS

DATED 07-16-2021

101.02

On page 7, **Add** the following abbreviation below ASCE:

ASLA American Society of Landscape Architects

101.02

On page 9, **Add** "ITS Intelligent Transportation System" below "ITE Institute of Transportation Engineers".

101.02

On page 9, **Replace** "OTE Office of Traffic Engineering" with "OTO Office of Traffic Operations".

101.02

On page 10, **Replace "**REA Rural Electrification Administration" with the following:

REA Rural Electrification Act

101.02

On page 13, Delete the following:

~~QCQC Quality Control Qualifications Committee~~

101.03

On page 13, **Replace** the definition of Engineer with the following:

Engineer. Duly authorized agent of the Department acting within the scope of its authority for purposes of engineering and administration of the Contract. In managing the administration of the contract, the Engineer may confer with representatives of Industry including, but not limited to, the designer of record, landscape architects, environmental specialists, etc.

101.03

On page 14, **Add** the following definition below **Prebid Question**:

Professional Landscape Architect. A landscape architect registered with the Ohio Landscape Architects Board to practice landscape architecture in the State of Ohio.

102.16

On page 22, **Delete** the following:

102.16 Certificate of Compliance with Affirmative Action Programs. Before any Contract is awarded, the Department will require the Bidder to furnish a valid Certificate of Compliance with Affirmative Action Programs, issued by the State EEO Coordinator ~~dated prior to the date fixed for the opening of bids~~.

104.02.D

On page 25, **Replace** the first full paragraph with the following:

If the Contractor disagrees as to whether an alteration constitutes a significant change, use the notification procedures specified in 108.02.F.

104.02.D

On page 25, **Replace** item a. under Table 104.02-1 with the following:

a. the estimated quantity of a contract item exceeds four units (this minimum quantity does not apply to pavement markings measured in units of miles), and

106.09

On page 38, **Replace** the entire section 106.09 with the following text:

106.09 Steel Products Made in the United States. Furnish steel products that are made in the United States according to the applicable provisions of State of Ohio laws, ORC 153.011 and 5525.21. "United States" means the United States of America and includes all territory, continental or insular, subject to the jurisdiction of the United States.

A. State Requirements. All steel products used in the Work for load-bearing structural purposes must be made from steel produced in the United States. State requirements do not apply to iron.

B. Exceptions. The Director may grant specific written permission to use foreign steel products in bridge construction. The Director may grant such exceptions under either of the following conditions:

1. The cost for each contract item used does not exceed 0.1 percent of the total contract cost, or $2,500, whichever is greater. For the purposes of this section, the cost is the value of the steel product as delivered to the project.

2. The director determines that specified steel materials are not produced in the United States in sufficient quantity or otherwise are not reasonably available to meet contract requirements.

C. Proof of Domestic Origin. Furnish documentation to the Engineer showing the domestic origin of all steel products covered by this section, before they are incorporated into the Work. Products without a traceable domestic origin will be treated as a non-domestic product.

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106.12

On page 39, **Add** the following section after 106.11.

106.12 Traffic Authorized Product. The Department may use Traffic Authorized Product (TAP) List for approval of products used in Intelligent Transportation Systems (ITS) or Traffic Signal Systems. The Office of Traffic Operations will maintain the TAP and the standard procedure for the TAP process. Inclusion of a product onto the TAP will be determined by Office of Traffic Operations with support from other Department offices. To be kept on the TAP, manufacturers must recertify their product according to the Department's standard procedure by February 28 of each year. When a product requires TAP acceptance, only provide products listed on the TAP at the time of delivery of the product to the project. Provide the Engineer documentation according to the Department's standard procedure that, at the time of delivery, the material provided is on the TAP.

107.07

On page 40, **Add** the following paragraph after the first paragraph:

Any illegal drugs, drug paraphernalia, mobile drug labs or dumps, weapons or firearms found on the Project Right of Way shall be considered a potential crime scene and shall not be handled or moved. Immediately notify law enforcement and the Project Engineer.

107.13

On page 46, **Replace** the last sentence in the last paragraph with the following:

The decision of the DCE will be made within 14 days and will be administratively final.

107.15

On page 47, **Replace** the second paragraph with the following:

In the event that the Engineer determines that damage to completed permanent items of Work results from traffic using a substantially completed section of Roadway, the Department may compensate the Contractor for repair of the damage as authorized by Change Order. Additionally, if traffic permanently damages beyond use and of the following temporary maintenance of traffic items, the Department may compensate the Contractor for replacement of the item as authorized by Change Order:

1. Arrow board.
2. Work zone signal, pole, or controller.
3. Lighting unit or pole.
4. Changeable message sign.
5. Work Zone Impact Attenuator
6. Truck Mounted Impact Attenuator
7. Digital Speed Limit Sign Assembly

107.15

On page 47, **Replace** the **A.** through **D.** with the following:

To receive compensation for the damage to permanent items of Work or temporary maintenance of traffic items named above, the Contractor must first meet the following requirements.

A. Notify the Engineer of each occurrence of damage in writing within 10 Calendar Days.

B. Contact the local law enforcement agency to determine if the accident was investigated and a report filed. If an accident report was filed, obtain the report and notify the motorist, and copy their insurance company, via certified mail informing both that the motorist is responsible for the cost of damage repairs. If the motorist does not respond within 30 days, make a second attempt to contact the motorist and copy the insurance company via certified mail.

C. If no response is received from the motorist or insurance company within 30 days of the motorist receipt of the second notice, send a letter to the Engineer within eighteen months of the event and include documentation of good faith effort to seek recovery from responsible parties.

D. The Department will make an adjustment according to 108.06 and 109.05 to compensate the Contractor for the added costs and delays, if any, resulting from the repair or replacement of damaged Work.

If there is no accident report on file and no means of identifying the responsible motorist, the Contractor may likewise be compensated to repair the damaged Work.

107.21

On page 50, Replace the paragraph with the following:

107.21 Prompt Payment. In accordance with ORC 4113.61, make payment to each subcontractor and supplier within 10 Calendar Days after receipt of payment from the Department for Work performed or materials delivered or incorporated into the Project, provided that the pay estimate prepared by the Engineer includes Work performed or materials delivered or incorporated into the public improvement by the subcontractor or supplier. Contractors are prohibited from holding retainage from subcontractors that can provide a bond. For unbonded subcontractors and suppliers,

promptly release any retainage held, as set forth in any subcontractor or supplier agreement, 30 days after the work is satisfactory completed. For the purposes of this section, satisfactory completed will be interpreted as when the subcontractor has completed all physical work and submitted any necessary documentation required by the specifications and the Department. No subcontract provision shall permit the Contractor to delay subcontractor's retainage payments until the Project's final payment.

108.02.B.

On page 53, **Add** the following item to Section B after number 7:

8. On-line surveys of Project participants may be used to evaluate Project goals and help identify issues either before or immediately after the Initial Partnering Session. The on-line survey is located on the Division of Construction Management's Partnering website:
http://www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx

108.02.E.

On page 53, **Replace** Section E with the following:

E. Partnering Monitoring. Monitor the progress of the Partnering relationship based on the goals decided during the Initial Partnering Session. On-line surveys of Project participants may be used to monitor progress on Project goals and help identify issues as they arise. The on-line survey is located on the Division of Construction Management's Partnering website:
http://www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx

108.02.I.

On page 59, **Replace** Section I with the following:

I. Partnering Close-Out Survey. On-line surveys of Project participants may be used to get participants' feedback and improve the Partnering process. The Partnering Close-Out Survey is located on the Division of Construction Management's Partnering website:
http://www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx

108.06.C

On page 64, **Add** the following paragraph after the first paragraph under the table:

Lane closures within the project, 60 days or less as indicated in the contract documents, which are impacted by weather will be extended for the actual work days lost each month. Lane closures within the project, 61 days or longer as indicated in the contract documents, which are impacted by weather will be extended when the actual work days lost exceeds the number of anticipated work days lost each month as determined by Table 108.06-1.

108.06.D.4

On page 64, **Replace** item D.4. with the following:

4. Delays due to acts of the government or a political subdivision other than the Department.

108.07

On page 65, **Replace** the fifth paragraph in section 108.07 "The Director may stop deducting liquidated damages when:" with the following:

Provided the project is available for use as intended by the Contract and the Work remaining will not impact traffic, the Contractor may submit a request that the Department suspend the assessment of liquidated damages for a stated period of time. For the limited purposes of assessing liquidated

damages, the closing of a shoulder is not considered an impact upon traffic. Submit this request within 30 days of the assessment of the liquidated damages. In addition to the written plan required to remain in control of the Work as stated above, this request should include at a minimum the Work left to be completed, the reason(s) the Work is incomplete or on hold, as well as, methods, resources and timelines for pursuing the same. This will define diligent pursuit of the work. Once accepted, and provided both of the following criteria are met, the Department may suspend the assessment of liquidated damages:

108.07

On page 65, **Replace** the subsections A through E with the following:

A. The Contractor is diligently pursuing the remaining Work.

B. Necessary items are completed and operational to provide an appropriate level of safety to the traveling public. These items include but are not limited to signs, pavement markings, guardrail, attenuators, signals and RPM's.

~~**108.07**~~

~~On page 65, **Add** the following paragraph after Item E and before TABLE 18.07-1:~~

~~The Contractor may submit a request for waiver of liquidated damages to the Department within 30 days of the assessment of liquidated damages.~~

108.07

On page 65, **Replace** Table 108.07-1 with the following:

TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for Each Calendar Day of Overrun in Time
From More Than	To and Including	
$0.00	$500,000	$450
$500,000	$2,000,000	$650
$2,000,000	$10,000,000	$1,000
$10,000,000	$50,000,000	$1,700
Over $50,000,000		$3,100

109.05.C.8.b

On page 81, **Replace** the second paragraph with the following:

b. Trucking that is subject to the prevailing wage law will be compensated according to 109.05.C.1, 109.05.C.2, 109.05.C.4, 109.05.C.6, and 109.05.C.10.

109.05.C.10

On page 82, **Replace** the last paragraph with the following:

In the event the Contractor declines to sign the Daily Force Account Record, the Department's records shall govern. Any resulting dispute must be pursued in accordance with 108.02.G.

109.09

On page 87, **Replace** the second paragraph with the following:

Except for the final estimate, the Department will not pay an estimate until the Contractor certifies to the Engineer that the work for which payment is being made was performed in accordance with the contract. Certification will be made on forms provided by the Department.

202.05

On page 96, **Replace** the 1st and 2nd paragraphs with the following:

202.05 Pavement, Walks, Curbs, Steps, Gutters, or Traffic Dividers Removed. As designated, remove and dispose of the existing concrete pavement, asphalt pavement, wearing course, brick, walks, steps, gutters, curbs, and concrete traffic dividers. If removing only a portion of an existing pavement, walk, step, gutter, curb, or traffic divider, saw or otherwise construct a neat joint at the removal limit.

If Pavement Removed is specified, remove all pavement layers, including asphalt, concrete, and brick, from the surface to the bottom of the pavement courses as shown on the plans. Pavement Removed does not include removal of any unbound aggregate or natural soil material. If Wearing Course Removed is specified, remove all asphalt from the surface to the top of the concrete, brick, or both, or to the depth shown on the plans. If the existing surface is brick and Wearing Course Removed is specified, remove all brick from the surface. If Concrete Median Removed or Concrete Barrier Removed is specified, remove all the concrete to the depth specified in the plans.

202.13

On page 99, **Replace** the first paragraph with the following:

202.13 Basis of Payment. Payment is full compensation for all work involved in the removal and storage, reuse, or disposal of structures and obstructions, including excavation and backfill incidental to their removal, saw cutting, removing the contents of the underground storage and septic tanks and the custody, preservation, storage on the Right-of-Way, and disposal as provided in this specification.

202.13

On page 100, **Delete** the following:

~~202 Square Yard (Square Meter) Base Removed~~

~~202 Each Precast Traffic Divider Removed for Reuse or Storage~~

202.13

On page 100, **Add** the following below 202 Foot (Meter) Curb Removed for Storage:

202	Foot or Square Yard (Meter or Square Meter)	Concrete Median Removed
202	Foot (Meter)	Concrete Barrier Removed

203.02.B.

On page 101, **Delete** the entire section:

~~**B. Base.** Selected material of planned thickness placed on the subgrade as a foundation for other bases, or asphalt or concrete pavements. The base is a part of the pavement structure.~~

203.04

On page 103, **Replace** the second sentence of the fifth paragraph with the following:

The area is considered to contain hazardous waste or material and must be handled according to Department procedures and appropriate environmental agency regulatory requirements.

203.04.E

On page 104, **Delete** the entire section:

~~**E. Pavement Widening Construction.** Locate sound pavement edges, and cut and trim pavement to a neat line. Repair and restore damage caused by the equipment or methods. Include the cost of cutting, trimming, and disposal under Item 203 Excavation.~~

301.02

On Page 161, **Add** the following paragraph after the last paragraph in the section:

Do not start mix production without a preliminary JMF approval and 48 hour notification to District Testing. Final approval of a JMF will be based upon field verification. The JMF can be rejected for failure to verify in the plant or at the project.

302.02

On Page 163, **Replace** the third full paragraph and the numbered items below it with the following:

Use equipment that meets the requirements of a Level 3 laboratory as specified in Supplement 1041.

302.03

On Page 164, **Add** the following paragraph after the first sentence in the section:

Do not start mix production without a preliminary JMF approval and 48 hour notification to District Testing. Final approval of a JMF will be based upon field verification. According to 441.12 the JMF can be rejected for failure to verify in the plant or at the project.

401.03

On Page 173 **Revise** the first paragraph of 401.03 as follows:

Furnish materials conforming to:

Asphalt binder
(asphalt concrete, 401.14, 401.15)……..702.01

Asphalt material (401.14, 401.17, 401.18)…… ~~SS875.02,~~ 702.01, 702.04, 702.09, 702.12 or 702.13

Aggregates (base courses)…….703.04

Aggregates (intermediate and surface courses)…….703.05

Mineral filler …….703.07

401.04

On Page 174 **Replace** the 4th full paragraph with the following:

Determine RAS properties and usage as follows. Use no more than 3.0 percent RAS by dry weight of mix. When using RAP and RAS in combination use no more than 25 percent RAP. For design assume 12.0 percent available RAS binder. Determine gradation and specific gravity according to AASHTO PP 78-17, Section 5 or subsequent AASHTO applicable standard. Provide the required certification forms in the JMF submittal documenting that the RAS meets AASHTO MP 23-15 (2016), section 4 and that RAS from roofing tearoffs conforms to the EPA's NESHAP, 40 CFR 61 Subpart M, and other applicable agency requirements for asbestos.

401.04

On Page 175 **Replace** Table 401.04-1 with the following:

TABLE 401.04-1 METHOD 1 – STANDARD RAP/RAS LIMITS

Asphalt Mix Application	Percent RAP by Dry Weight of Mix, Max.	RAS Usage [1]	Total Virgin Asphalt Binder Content, Min.	Comments
442 Polymer Surface Course	10%	None	5.2	Polymerized binder is virgin. (For non-polymer virgin binder allow 20% max RAP)
441 Surface Course	20%	None	5.0	Polymer or non-polymer virgin.
441, 442 Intermediate Course	35%	Manufacturing waste and tear-offs	3.0	Any mix type used as an intermediate course.
301 Base Course	50%	Manufacturing waste and tear-offs	2.7	OMM will establish the asphalt binder content.
302 Base Course	40% (30%)	Manufacturing waste and tear-offs	2.0	A lower RAP limit of 30 percent will be required if poor production mixing or coating is evident.

[1]No more than 3.0% RAS by dry weight of mix

401.04

On Page 176 **Replace** Table 401.04-2 with the following:

TABLE 401.04-2 METHOD 2-EXTENDED RAP/RAS LIMITS

Asphalt Mix Application	Percent RAP by Dry Weight of Mix, Max.	RAS Usage [1]	Total Virgin Asphalt Binder Content, Min.	Comments
442 Polymer Surface Course	15%	None	5.0	Polymerized binder is virgin. (For non-polymer virgin binder allow 25% max RAP)
441 Surface Course	25%	None	5.0	Polymer or non-polymer virgin.
441, 442 Intermediate Course	40%	Manufacturing waste and tear-offs	3.0	Any mix type used as an intermediate course.
301 Base Course	55%	Manufacturing waste and tear-offs	2.5	OMM will establish the asphalt binder content.
302 Base Course	45% (35%)	Manufacturing waste and tear-offs	1.8	A lower limit of 35 percent will be required if poor coating is evident. The virgin requirement of 302.02 does not apply.

[1]No more than 3.0% RAS by dry weight of mix

401.04.C

On Page 176, **Replace** the first sentence in the second paragraph with the following:

Ensure RAS is processed to have 100 percent passing the 1/2 inch (12.5 mm) sieve and at least 90 percent passing the No. 4 (4.75 mm) sieve.

401.08

On Page 178, **Add** the following paragraph after the first paragraph:

At a minimum, take a split sample of asphalt binder whenever the Department requests a sample. Address in the QCP the QC of mix plant asphalt binder samples and subsequent corrective action of binder test failures of any sample (QC or Department). Failure to perform QC of asphalt binder samples is at the Contractor's risk. Any Department binder sample failures will result in penalties per Supplement 1102. These include remove and replace, pay deductions, or other penalties for the asphalt mix represented by the Department's sample.

401.11

On Page 179 **Add** the following sentence to the end of the second paragraph of 401.11:

Any use of non-approved release agent, diesel, or fuel oil may result in suspension of truck, driver, or both for up to one year.

401.16

On Page 184, **Delete** the fourth paragraph:

~~Compact intermediate and surface mixtures using a three-wheel roller in the breakdown position (roller immediately behind the paver) of the roller train; however, in small areas, compact these mixtures as the Engineer approves using any of the roller types specified in 401.13.~~

401.16

On Page 184, **Replace** the eighth paragraph in the section with the following:

Do not use vibratory rollers on courses with a thickness under 1 1/4 inches (32 mm).

401.16

On Page 185, **Delete** the first paragraph:

~~If using vibratory rollers, supplement them with three-wheel or pneumatic tire rollers.~~

402.02

On Page 188, **Replace** the entire section with the following:

402.02 Calibration. Ensure the plant is calibrated according to Supplement 1101 when producing any asphalt concrete for the Department. Calibrate the asphalt binder meter according to Supplement 1101.07 Method A or B. When calibrating the asphalt binder meter according to Method B, daily aggregate and RAP weighbridge validations are required to be performed according to Supplement 1101.06. Document which plants follow Supplement 1101.01 Method B in the Quality Control Program (403.03). If issues persist for Method B calibrations or documentation, the Department will require the plant to follow Method A. When performing a complete calibration for ODOT projects notify District Testing 24 hours in advance of the calibration.

403.02

On Page 190, **Replace** the second paragraph with the following:

Restoration of VA procedures will be by the Department's Quality Control Review Group (QC Review Group) based on District recommendation and review of the Contractor problems, resolutions and QCP. The QC Review Group consists of asphalt the Materials Engineer, Office of Materials Management; the Administrator, Office of Materials Management; and the Pavement Engineer, Office of Construction Management.

403.03

On Page 190, **Add** the following sentence to the end of the first paragraph:

Include a revision date on the cover sheet and revision sheet listing the date(s), what section(s) and page(s) a revision was made, and a short description of what was revised, added, or removed.

403.03

On Page 190, **Replace** the third sentence in the second paragraph with the following:

Digital copies of the QCP and letter in pdf format are allowed in each Contractor plant laboratory and plant operation control room with the following requirements: The file icon must be appropriately labeled and be on the computer desktop of a computer in each area. Ensure the QCP contains page numbering and a Table of Contents inside the front cover locating all sections by page number. Remove out-of-date QCPs from the computer desktop.

403.03

On Page 191, **Delete** the second full paragraph.

~~The QCP is a reflection of a Contractor's sincerity and ability in producing a quality product. Development of this program beyond the minimum requirements specified below is encouraged and~~

~~is taken into consideration by the QCQC when reviewing Contractor plant operation for qualification for VA.~~

403.03

On Page 191, **Replace** the third full paragraph with the following:

As a minimum include in the program:

403.03.B

On Page 191, **REPLACE** subsection B with the following:

B. Means for annual training in ethical conduct according to company expectations of all company employees and consultants who are responsible for the mix design, production, testing, and placement of asphalt mix and their supervisors. Document how and when training is given, what the expectations are, how expectations are communicated and list all personnel trained. Describe the QC Manager's and supervisor's responsibilities and methods in ensuring ethical conduct is maintained throughout the year.

403.03.F

On Page 192, **Replace** the first paragraph with the following:

F. Methods to maintain all worksheets, including all handwritten records, and other test and sample records from all plant(s) and, or project(s) for a minimum of 8 years. Define the test record process. Define company records retention requirements. Provide copies of all test reports and forms used in the quality control process.

403.03.L

On Page 192, **Add** the following sentence after the last sentence in the paragraph:

Means of handling asphalt binder samples taken at the mix plant including any testing, labeling, and storing of samples.

403.03.N

On Page 192 **Replace** the paragraph with the following:

N. Define the roles and responsibilities of the Field Quality Control Supervisors. Provide a detailed description of how the FQCS will handle all mat issues including segregation, tenderness, mat tears, debris, holes, etc. List approved Field Quality Control Supervisors.

403.06

On Page 194, **Replace** the first paragraph with the following:

403.06 Verification Acceptance (VA). District Testing will perform the VA by testing independent and split samples. If the random Department VA sampling and testing verifies the accompanying Contractor tests, the average of the Contractor's quality control tests for each day or night (for Basic mix), the average of the Contractor's tests for each Lot (for 448 acceptance mix) or daily average MSG (446, 447, or 448 acceptance mixes) will be used to determine acceptance.

The Department may take Daily samples for verification of plant operation.

403.06.A.

On Page 194, **Replace** the section in its entirety with the following:

A. Sampling.

When sampling for Basic mixes or 441 quality control testing, the Contractor's technician will randomly select the truck in which to take a sample by using a random number procedure as outlined in the QCP. The Contractor's technician will give no indication to anyone of the time that the sample

is to be taken. Include the random number, sample tonnage location, and time of sampling on the daily Quality Control Report (Contractor form TE-199) with each test. Tests, other than the required random sample tests, are at the Contractor's discretion according to the QCP.

Provide a clean area of sufficient size and a hard surface to perform sample splitting. Split samples by quartering and recombining as described in AASHTO R 76, Method B for hard surfaces for the Department and Contractor's sample. Alternately, use a mechanical splitter per AASHTO R 47 meeting Type A followed by the quartering method. The split sample size required is generally 22 to 27 pounds (10,000 to 12,000 g). A mechanical quartering device approved by OMM may be used in lieu of the above but only split according to the procedure outlined in the Contractor QCP. Ensure that every quality control or 448 Sublot sample taken by the technician has a labeled split for the Department. Wrap and label split samples as to Lot or Sublot, time, location (tonnage), and accompanying Contractor test identification. The Monitoring Team will pick up all Department split samples within 4 workdays. Sample mishandling (careless identification, changing sample size, consistency, or pre-testing) will result in a change to Unconditional Acceptance.

For 448 acceptance mixes, conform to the procedures of Supplements 1035, 1038, 1039, and 1043. The District may require sampling from the road. .Lots will be 3000 tons (3000 metric tons), and Sublots will be 750 tons (750 metric tons). However, when production is limited to less than 3000 tons (3000 metric tons), consider the quantity produced as a partial Lot. For partial Lots of 1500 tons (1500 metric tons) or less sample and test at least two sublot samples regardless of the tons produced. Split and test all sublot samples taken by the Contractor from locations selected by the Monitoring Team or Engineer. The Contractor may test a QC sample at the required Sublot sample location as both a QC and Sublot test provided the sample is tested for all required quality control properties. Test results will apply for both QC and sublot requirements. A change in the location of the Sublot sample must be approved by the Monitoring Team and be reasonably close to the original location. This allowance does not apply to any other samples including Department VA sample locations selected by the Monitor. Label Department split samples as Sublot or quality control samples.

403.06.C.

On Page 195 **Replace** the section in its entirety, including Table 403.06-1, with the following:

C. Department Verification Testing and Monitoring. For Basic, 446, 447, and 448 acceptance mixes the Monitor will randomly choose one Department sample in a maximum of every four production days for VA testing to confirm Contractor testing and mix control. The Department can require samples from the project site (hopper, plate or truck). More frequent VA samples can be taken when desired. The Department VA sample location will be chosen randomly by the Monitor, including where to take the sample, if applicable The Contractor technician will take the sample with the Monitor witnessing. The Monitor will keep the sample in the Department's possession until delivered to District Testing or testing is complete. The Monitor will have enough sample taken to split with the Contractor. The Monitor will split the sample in the Contractor lab. The Monitor will have the sample tested at District Testing or as noted below. The Contractor will test the split of the VA sample with the Monitor witnessing. The Department will use its VA test result, the Contractor result of the split, as well as the most recent previous day (or night) Contractor quality control and/or sublot test in the comparison for the Department VA testing.

The Monitor may opt to test the Department VA sample in the plant laboratory with the Contractor's permission, according to the Contractor's safety practices, and with the restriction of only the Contractor's technician physically placing a sample pan in the AC Gauge. However, if the Monitor tests VA samples on Contractor equipment, test a VA sample on District Testing equipment a minimum of one time in 15 production days from a given plant regardless of the number of projects or JMFs tested in the Level 2 lab. Record the results and testing location in the District Testing project

record. One day may be added to the above Department sample testing frequency for each day production is less than 500 tons (450 metric tons).

For 446, 447, and 448 acceptance mixes MSG VA testing will be performed by District Testing a minimum of one in every four days. The MSG VA may also include the District-sampled Daily samples, 448 sublot samples, or samples split with the Contractor at the plant. The MSG VA result from samples acquired independently from QC samples will be compared to that days Contractor average of MSG QC test results. Any MSG split sample results will be compared with the Contractor split result. For all mixes, the District may increase the number of VA testing samples if desired.

All Department VA test results will be given to the Contractor by a reasonable arrangement acceptable to both. Department VA sample testing not completed in a timely manner is of no value in verifying quality control testing quality for Contractor test acceptance and/or investigating problem causes. As such, if not completed in a timely manner, Contractor tests will automatically stand and the District will note the problem in the District's VA record.

TABLE 403.06-1 DEPARTMENT VERIFICATION ACCEPTANCE AND QUALITY CONTROL TEST COMPARISON

	Percent Asphalt Binder		**Percent Passing No. 4 (4.75mm)**		**MSG Comparison**
	VA [1]	QC/lot test [2]	VA [1]	QC/lot test [2]	VA [3]
Basic	±0.3	±0.4	±4.0	±5.0	
446, 447, 448	±0.3	±0.3	±4.0	±4.0	0.010

[1] District VA mix test deviation from Contractor split and from the approved JMF. For Basic mixes, use the tolerances in Table 403.06-2 when comparing District VA to JMF.

[2] District VA mix test deviation from most recent previous day (or night) QC and/or lot test.

[3] Deviation of District MSG VA compared to QC MSG daily average.

If the Department VA tests confirm Contractor testing is within the verification tolerances, but a pattern of high or low results exist that suggests mix control is not at the JMF, then investigate with the Monitoring Team's assistance to correct the problem to the Monitoring Team's satisfaction. Direct any questions regarding interpretation of circumstances to OMM.

403.06.E.

On Page 197, **Replace** the first sentence of the first paragraph with the following:

E. Contractor Tests Not Verified. If the Department MSG VA test shows the MSG comparison tolerance in Table 403.06-1 is not met, a single Department tested MSG for that day and every prior production day back to when the Department MSG VA last met the tolerance will be used for each 446, 447, or 448 Day/Lot density and QC air void determination.

403.06.F

On Page 198, **Replace** the last paragraph with the following:

For all other mixes, if repeated problems with poor comparison of tests are not the District's fault; or poor comparison of Contractor tests to the JMF; or with plant operation, input materials, or any of the other requirements of Department specifications occur in a single project or successive projects, the District will request an opinion from the QC Review Group before notifying the Contractor of removal from Department VA. The District will immediately notify the Contractor of the removal with a follow up letter from District Testing. Once notified, acceptance of asphalt mixtures is by Unconditional Acceptance. Restoration of the VA procedures may occur on a future project with a

District recommendation to the QC Review Group based on consistent improved plant operation and mix control, a review of the Contractor problems and resolutions, and a review of the QCP by the QC Review Group.

421.02

On Page 210, **Replace** the entire section with the following:

421.02 Materials. Furnish materials conforming to:

Emulsified Asphalt (Binder) ..... 702.16, Type C
Aggregate 703.01, 703.05
Water 499.02
Mineral Filler (Portland Cement) 701.04
Tack Coat 421.09

Use a quick-traffic polymer modified emulsified asphalt binder (Binder) conforming to 702.16, type C. Use only Binder certified according to Supplement 1032. Provide to the Engineer certified test data and a statement from the Binder supplier with each load of Binder that the Binder is the same base asphalt binder, polymer, polymer percentage as formulated and used in the mix design. Include the percent residue on the Bill of Lading.

Conform to 703.01 and 703.05 for aggregate, except as follows:

TABLE 421.02-2

Percent by weight of fractured pieces	100
Sand Equivalence (AASHTO T176)	55 minimum

Do not use aggregates designated with “SR” or “SRH.”

Provide an aggregate blend of 50 percent crushed carbonate stone (CCS) and 50 percent igneous diabase (ex. Ontario Trap Rock) for Surface Course (FR). Provide CCS aggregates for all other microsurfacing courses.

Provide a final blend of aggregates that conform to Table 421.02-3 Gradation A for the aggregate for surface courses, Gradation B for the aggregate for rut fill courses, and Gradation A or B for the aggregate for leveling courses. Stockpile tolerance will be based on target gradation stated in the mix design but will not exceed design gradation band for No. 200 sieve.

TABLE 421.02-3

Sieve Size		Total Percent Passing		
		A	B	Stockpile Tolerance
3/8 inch	(9.50 mm)	100	100	
No. 4	(4.75 mm)	85 to 100	70 to 90	± 5.0%
No. 8	(2.36 mm)	50 to 80	45 to 70	± 5.0%
No. 16	(1.18 mm)	40 to 65	28 to 50	± 5.0%
No. 30	(600 µm)	25 to 45	19 to 34	± 5.0%
No. 50	(300 µm)	13 to 25	12 to 25	± 4.0%
No. 100	(150 µm)	–	7 to 18	± 3.0%
No. 200	(75 µm)	5 to 15	5 to 18	± 2.0%

Screen the aggregate for oversize material prior to use using a 3/8 inch (9.5 mm) screen size. When a blend of aggregates is to be used to meet gradation A or B, proportion the aggregates in a separate stockpile and blend to a uniform consistency prior to screening. Screen the aggregate to complete the blending process and to remove any oversize material prior to use. If oversize material becomes present in the mixture, screen the aggregate directly into material support units.

For mineral filler, use Supplement 1028 Certified Portland cement conforming to ASTM C 150, Type I. Adjustments in the quantity of mineral filler added to the mixture are permitted to improve mixture consistency, mix time, or set time. Do not exceed ± 0.5% from the mix design during placement.

Use water conforming to 499.02. Add water to the mixture to control mixture consistency only and not to control mix time.

Use mix set additives as stated in the mix design to control the mixture's mix and set time. If mix set additives are used during production of mixture, include as part of the mix design. Ensure additives are compatible with the other components of the mix.

421.03

On Page 212, **Replace** the second paragraph of the section with the following:

Submit the mix design and proposed materials to OMM. Include a minimum of 11 pounds (5,000 g) of each aggregate, one quart (1 L) sample of Binder, 3.5 ounces (100 g) of mineral filler, and one pint (0.5 L) of additive, if used, and a complete mix design packet prepared by an AASHTO-accredited laboratory in Pavement Preservation. Prepare the mix design for gradations A or B and present all test data for all tests specified in Table 421.03-1. Determine the residual binder content and present related proportioning of total water (includes moisture in aggregate), mineral filler, and additive with tolerances for each in the final designed mixture. Verify during the mix design the compatibility of the aggregate, Binder, mineral filler, and other additives. Produce the mix design using the same materials that will be used on the project. Approved JMF's expire on December 31st.

421.03

On Page 213, **Replace** Table 421.03-1 with the following:

TABLE 421.03-1

ISSA Test No.	Description	Specification
TB-139	Wet Cohesion	
	30 minutes min. (set time)	12 kg-cm min.
	60 minutes min. (traffic)	20 kg-cm min or near spin
TB-114	Wet Stripping	90 percent min.
TB-100	Wet Track Abrasion Loss 1-hour soak 6 day soak	 450 g/m² max. 650 g/m² max.
TB-144	Saturated Abrasion Compatibility	2 g loss max.
TB-113	Mix Time @ 25 °C	Controllable to 120 seconds
	Mix Time @ 40 °C	Controllable to 45 seconds
TB-147	Lateral Displacement (For Leveling and Rut Fill courses only)	5%, max.
TB-109	Excess Asphalt by LWT Sand Adhesion	538 g/m² max.

421.03 A.

On Page 212, **Replace** list item number 2 with the following:

2. Has residual asphalt by dry weight of aggregate of 7.5 to 8.5 percent for leveling and surface courses or 6.5 to 8.0 percent for rut fill courses.

421.03.A

On Page 213, **Replace** the first sentence after Table 421.03-1 with the following:

Check the ISSA TB-139 (set time) and ISSA TB-113 (mix time) tests at the highest and lowest temperatures expected during construction.

421.03.B.8

On Page 213, **Replace** B.8. with the following:

8. Quantitative effects of moisture content on the unit weight of the aggregate per AASHTO T 19 from 0.0 to 10.0% moisture content.

421.04

On Page 213, **Replace** the first paragraph of the section with the following:

421.04 Quality Control Program (QCP). Create and implement a Quality Control Program (QCP) for each construction season. The QCP will cover processes conducted to provide a microsurface mixture at the project site that is uniform in composition, conforms to the specification requirements and project mix design, and that when placed is free of any defects (lack of mixing, inconsistent texture, inconsistent profile, excessive overlap at joints, streaking, drag marks, roughness, raveling, rutting, holes, and debris, etc.) within the Contractor's control at project completion. Submit a hard copy of the proposed QCP to OMM for review and acceptance. Submit by February 28 or a minimum of five (5) weeks before calibration. Include a revision date on the cover sheet and revision sheet listing the date(s), what section(s) and page(s) a revision was made, and a short description of what was revised, added, or removed.

421.04.C

On Page 214, **Replace** paragraph C. with the following:

C. Provisions to meet the Department mix specifications including warning bands and action plans for aggregate, Binder, and tack coat materials to ensure they meet Department testing.

421.04 E.

On Page 214, **Replace** Paragraph E. with the following:

E. Methods to maintain all worksheets, including all handwritten records, and other test and sample records from the project for the duration of the contract or eight years, whichever is longer. Define the test record process. Define company records retention requirements. Provide copies of all test reports and forms used in the quality control process.

421.09

On Page 217 **Replace** the third and fourth paragraphs of the section with the following:

Remove all existing pavement markings so that less than 5% of the line remains visible. Repair damage to the pavement that results in the removal of more than 1/8 inch of pavement thickness. When a grinder drum is mounted to a skid steer loader, the drum must be able to accommodate a minimum of 150 teeth.

Seal visible joints and cracks longer than 2 feet (600 mm) in length and any joint or crack greater than 1/4 inch (6 mm) in width no matter the length using Item 423 Type II only. Apply crack sealant material at a width of 2 to 4 inches (50 to 100 mm) and at a thickness of not less than 1/16 inch (2 mm) and not greater than 3/16 inch (5 mm).

421.09

On Page 217, **Replace** the fifth paragraph of the section with the following:

Apply a tack coat to the existing pavement surface conforming to 702.16, Type C CSS-1hM, consisting of a minimum of 15% asphalt residue achieved by diluting with water. Apply the tack coat at a rate of 0.06 to 0.12 gallons per square yard (0.25 to 0.45 L/m²) that provides uniform coverage without excess run-off and allow tack to break before releasing to construction traffic. Adjust application rate of tack coat based on surface texture and porosity. Apply the tack coat only to areas that will be covered by the microsurface during the same day. Do not apply tack coat on top of a leveling course prior to placing the surface course.

421.12

On Page 219, **Replace** the next-to-last sentence in the first paragraph with the following:

Present a revised corrective action plan and obtain the Engineer's approval before resuming work.

421.12.A

On Page 220, **Replace** the entire section with the following:

A. Binder. Obtain and label a Binder sample from supply tanker and diluted tack coat sample from the distributor truck at the direction of the Engineer and give the samples to the Engineer the same day. Provide and sample the Binder and diluted tack coat in one-quart (1 L) plastic containers with plastic screw tops. Label and retain one sample per each additional day for the Department. Take more samples when requested by the Engineer.

Visually inspect Binder in supply tanker(s) to ensure uniform material with no separation or contamination. Verify temperature of binder and tack coat. Monitor and verify proportioning of asphalt emulsion and water into distributor and proper mixing before use or sampling. Perform a minimum of one Binder and tack coat cook-off each production day to determine the residue content

of the Binder and tack coat and verify compliance. If residue content is in warning band or out of compliance provide the Engineer with corrective actions prior to using.

Ensure mixing equipment is set at design asphalt emulsion percentage during production. Do not exceed a tolerance of ± 0.3% residual content from the design residual content or the minimum and maximum content in the microsurface mix due to fluctuation in residual content in the Binder. If tolerance is exceeded, stop production. Correct the issue by correcting the Binder residual content by methods allowed by Supplement 1032 certified supplier or adjust the asphalt emulsion percent, if approved by the Engineer. Recalibrate the mixing equipment to the new adjusted asphalt emulsion percent to meet the design residual content of the microsurfacing mix for positive displacement mixing equipment.

421.12 B.

On Page 220, **Replace** the first and second paragraphs with the following:

B. Aggregate. Ensure the aggregate stockpile or final blended aggregate stockpile if two aggregates are used gradation does not vary by more than the stockpile tolerance in Table 421.02-3 compared to the approved JMF and does not exceed the design gradation band for No. 200 (75 µm) sieve. Ensure the percent passing does not change from the high end to the low end of the range for any two consecutive sieves.

Verify the blending and screening of aggregates at the stockpile site and sample the blended and screened aggregate for QC testing. When two aggregates are used, ensure that the 50/50 blend is within 5 percent based on each stockpile gradation and theoretical blend.

421.12 B.

On Page 220, **Replace** the second sentence in the third paragraph with the following:

Obtain three (3) aggregate samples from the stockpile and perform gradation testing on each sample according to AASHTO R 90, AASHTO R 76, Supplement 1004 (AASHTO T 11 where required), and moisture content per AASHTO T 255.

421.12 B.

On Page 220, **Replace** the fourth paragraph with the following:

At a minimum test one sample taken from the stockpile randomly during each production day. When two aggregates are used, sample a minimum of one sample from each stockpile and final blended stockpile randomly. Include additional testing when directed to sample and test by the Engineer. The Contractor may perform an additional aggregate test to verify results if first test is not in compliance with stockpile tolerance. Report and track all test results and monitor trends of the aggregate gradation within the stockpile.

421.12 D.

On Page 222, **Replace** list item number 8 with the following:

8. Total gallons (L) of tack coat used and residual asphalt content.

421.16

On Page 224, **Add** the following pay item to the list:

421	Square Yard (Square Meter)	Microsurfacing, Surface Course (FR)

422.02 C.

On Page 225 **Replace** the first sentence in the third paragraph of the section with the following:

If a staging location will be used for the chip seal aggregate first move the initially tested aggregates from the aggregate source stockpile to the staging location and construct a project-specific staging stockpile.

422.06

On Page 228 **Replace** the second paragraph of the section with the following:

Remove all existing pavement markings so that less than 5% of the line remains visible. Repair damage to the pavement that results in the removal of more than 1/8 inch of pavement thickness. When a grinder drum is mounted to a skid steer loader, the drum must be able to accommodate a minimum of 150 teeth.

422.10 C.

On Page 231 **Replace** the first sentence of the section with the following:

C. Coarse Aggregate. At a minimum test one sample taken from the aggregate spreader box or project-specific stockpile at production start and sample and test one sample from the aggregate spreader box or project-specific stockpile randomly during the day.

422.10 C.

On Page 231 **Replace** the fifth sentence of the section with the following:

Sample and test aggregate according to AASHTO R 90, AASHTO R 76, and Supplement 1004 (AASHTO T 11 where required).

422.13

On Page 233 **Replace** the first paragraph of the section with the following:

422.13 Method of Measurement. The Department will measure Single Chip Seal or Double Chip Seal by the number of square yards (square meters) of aggregate, and the gallons (liters) of polymer emulsified binder, completed and accepted in place. The Department will determine the width by measuring the actual width of the chip seal. The Department will determine the length along the centerline of each roadway or ramp. The Department will determine the gallons (liters) of polymer emulsified binder applied according to Item 109.

422.14

On Page 234 **Replace** the Basis of Payment table with the following:

Item	Unit	Description
422	Square Yard (Square Meter)	Aggregate, Single Chip Seal, Type __
422	Gallons (Liters)	Emulsion, Single Chip Seal, Type ___
422	Square Yard (Square Meter)	Aggregate, Double Chip Seal, Type ___
422	Gallons (Liters)	Emulsion, Double Chip Seal, Type ___

423.02

On page 234 **Delete** the following:

~~Type III.....702.17.C~~

423.03

On page 235, **Delete** the following from the first sentence of the first full paragraph:

For Type II~~, III,~~ and IV crack sealants, heat the sealant in a kettle or melter constructed as a double boiler, with the space between the inner and outer shells filled with oil or other heat-transfer fluid.

423.03

On page 235, **Replace** the first sentence of the third full paragraph with:

For Type II ~~and III~~ crack sealants, use a mechanical applicator wand head capable of placing the crack sealant according to the tolerances of 423.07 while filling the cracks.

423.06

On page 236, **Delete** the following:

Mixing Type II ~~and III~~.

423.06

On page 236, **Add** the following sentence after the second sentence:

Type II crack sealant may also be prepackaged per 702.17.B.

423.06

On page 236, **Delete** the last sentence of the section:

~~Do not heat Type III crack sealant to greater than 295 °F (146 °C).~~

423.07

On page 236, **Replace** the first sentence of the fourth paragraph:

For Type II ~~and III~~ crack sealants, place the sealant such that it fills the cracks with a band of sealant within 2 to 4 inches (50 to 100 mm) wide.

423.10

On page 237, **Delete** the following:

~~423 Pound (Kilogram) Crack Sealing, Type III~~
~~or Square Yard~~
~~(Square Meter)~~
~~423 Pound (Kilogram) Crack Sealing, Type II or III~~
~~or Square Yard~~
~~(Square Meter)~~

424.03

On Page 238, **Add** the following sentence to the end of the second paragraph:

Do not use RAS.

441.09

On Page 244, **Replace** the last sentence of the first paragraph with the following:

Perform each quality control test a minimum of one time for each 700 tons (635 metric tons), or for any portion of 700 tons, of asphalt concrete produced, for every production day. A production day includes the period of time from when mix production begins to the time the last load of asphalt leaves the asphalt plant, either from the mix drum or from any storage silo. Any planned break in plant production to accommodate a new work shift triggers a new production day.

441.09

On Page 245, **Replace** the first full paragraph with the following:

Should additional testing as required above not be performed District Testing, after consultation with OMM, will require the testing frequency be increased to all tests every two hours of production for the remainder of the project. If this occurs, District Testing will request an opinion from the QC Review Group for action(s) against the technician and/or Contractor including but not limited to warning, removal and/or a change of the facility to Unconditional Acceptance.

443.01

On Page 253, **Replace** the second paragraph with the following:

The requirements of 442; and 446 or 447 apply except as follows. Do not use the warm mix asphalt method (402.04) for this item.

443.03

On Page 253, **Replace** Note [5] after Table 443.03-2 with the following:

[5] VCA = Volume of Coarse Aggregate (Calculated for mix and dry rodded conditions according to AASHTO R 46)

443.03.E

On Page 254, **Replace** the section with the following:

E. Reclaimed Asphalt Concrete Pavement and Shingles. Do not use reclaimed asphalt concrete pavement except as described in D above. Do not use reclaimed asphalt shingles.

443.08

On Page 256, **Replace** the entire section with the following:

443.08 Acceptance. After accepting the test strips, the Department will accept SMA according to 446.04; or 447.04, 447.05, and 447.06.

443.09

On Page 256, **Replace** the section with the following:

443.09 Basis of Payment. The Department will pay for accepted quantities of Stone Matrix Asphalt Concrete, complete in place, including test strip, at the contract price as modified by 446.04; or 447.05 and 447.06, as follows:

Item	Unit	Description
443	Cubic Yard (Cubic Meter)	Stone matrix asphalt concrete, 12.5mm, PG70-22M, (_____)
443	Cubic Yard (Cubic Meter)	Stone matrix asphalt concrete, 12.5mm, PG76-22M, (_____)

447

On Page 260, **Add** the following item number to the bottom of the list:

447.08 Application of Multiple Pay Factors

447.05

On Page 263, **Replace** TABLE 447.05-1 with the following:

TABLE 447.05-1 MAT DENSITY LOTS

Mean of Cores [1]	Pay Factor Surface Course
98.0% or greater	[2]
97.0 to 97.9%	0.94
96.0 to 96.9%	1.00
94.0 to 95.9%	1.04
93.0 to 93.9%	1.00
92.0 to 92.9%	0.98
91.0 to 91.9%	0.90
90.0 to 90.9%	0.80
89.0 to 89.9%	[3]
Less than 89.0%	[2]
[1]Mean of cores as percent of average MSG for the production day.	
[2]Remove and replace.	
[3]The District will determine whether the material may remain in place. If the District determines the course should be removed and replaced, the Contractor will remove and replace this course. The pay factor for such material allowed to remain in place is 0.70.	

447.06.A

On Page 263, **Replace** the entire subsection A with the following:

A. Excluded Joints. Do not obtain joint cores from the following excluded joints to determine lot incentive/disincentive payment.

1. Joints where one side of the joint is formed by existing pavement not constructed on the project.
2. Joints within 15 feet longitudinally of an obstruction during construction of the wearing course (manholes, inlet grates, utilities, bridge structures, etc.)
3. Joints where plan material type, thickness, or acceptance method varies from one side of the joint to the other.
4. Joints on ramps.
5. Joints in intersections, gore areas or transitions, or anywhere the Engineer determines paving and phasing methods do not allow for consistent longitudinal joint construction. Prior to paving, submit requests in writing to the Engineer for consideration of any joints to be excluded on this basis. The Engineer will make the final determination.

447.06.C

On Page 264, **Add** the following paragraph after Table 447.06-1:

The Department will calculate a joint density lot pay factor for each item specified with 447 acceptance. The calculated pay factor adjustment will be applied to all material placed under the corresponding line item specifying 447 acceptance.

447.08

On Page 265, **Add** the following new section after 447.07:

447.08 Application of Multiple Pay Factors. The Department will apply a mat density pay factor to each Mat Density Lot as defined in 447.05. The Department will apply one joint core density pay factor to all material placed under the corresponding line item of work specifying 447

acceptance as defined in 447.06. The Department will apply mat and joint core density factor to the contract unit bid price for the corresponding line item of work specifying 447 acceptance.

451.09

On Page 271, **Replace** the first eight paragraphs with the following:

451.09 Joints. Unless otherwise directed, construct all transverse contraction and construction joints normal to the centerline of the pavement lane and of the type, dimensions, and at locations specified. Construct contraction joints by saw cutting. Saw contraction joints across the full pavement width for a continuous joint and match previously placed lanes.

Construct longitudinal joints between simultaneously placed lanes by sawing.

Accurately mark the pavement with the correct locations of all joints to be saw cut. Ensure the method of marking remains clearly visible after the paver passes and until the joint saw cut is completed. Reapply curing compound according to 451.11 at saw cut joints.

Use either a standard water-cooled, diamond-bladed concrete saw or an early-entry, dry cut, light-weight concrete saw. Provide saws with adequate guides, blade guards, and a method of controlling the depth of cut. After wet sawing, clean the joint using a jet of water. After dry sawing clean the joint using air under pressure. Maintain a standby saw in working condition and an adequate supply of blades.

When using standard concrete saws, and for pavement less than or equal to 10 inches (255 mm), saw joints to a minimum depth of one-fourth the specified pavement thickness. For pavements greater than 10 inches (255 mm) thick, saw joints to a minimum depth of one-third the specified pavement thickness. Saw joints 1/4 ± 1/16 inch (6 ± 1.6 mm) wide measured at the time of sawing.

When using early-entry saws use saw blades and skid plates as recommended by the saw manufacturer for the coarse aggregate type being used in the concrete. Saw joints 1/8 inch (3 mm) wide and 2 1/4 to 2 1/2 inches (56 to 63 mm) deep.

Repair all cracking or spalling according to 451.17.

451.09.A.

On Page 272, **Replace** the entire section with the following:

A. Longitudinal Joint. Place deformed epoxy coated steel tiebars, epoxy coated hook bolt with epoxy coated coupling, or epoxy coated hook bolt alternate (wiggle bolt) with epoxy coated coupling, in longitudinal joints during consolidation of the concrete. Install them at mid-depth in the slab using approved mechanical equipment. As an alternate procedure, rigidly secure them on chairs or other approved supports to prevent displacement. Provide tie bars, hook bolts, or wiggle bolts of the size and spaced as shown on the standard construction drawings. If used, securely fasten hook bolts or wiggle bolts with couplings to the form at the longitudinal construction joint as shown on the standard construction drawings.

451.09.B.

On Page 273, **Delete** the first sentence of the section:

~~Unless otherwise directed, construct all transverse joints normal to the centerline of the pavement lane and of the type, dimensions, and at locations specified.~~

451.09.B.1.

On Page 273, **Replace** the third paragraph of the section with the following:

Immediately before paving check that the assemblies are held firmly in place and check that the dowels are parallel to the grade and parallel to centerline of pavement.

451.09.C.

On page 280, **Replace** the first sentence of the first paragraph with the following:

Where a pressure relief joint is not provided adjacent to a bridge structure, construct expansion joints at the first two regularly spaced transverse contraction joint locations adjacent to the bridge approach slab on each side of the bridge.

451.09.C.

On Page 280, **Replace** the first sentence of the third paragraph with the following:

Use round, straight, smooth, steel dowels, and within 2 hours prior to placing concrete, coat the dowels with a thin uniform coat of new light form oil as a bond-breaking material to provide free movement.

451.09.C.

On Page 280, **Replace** the fourth paragraph with the following:

Punch or drill proper size dowel holes into the preformed expansion joint filler to ensure a tight fit around each dowel.

451.09.D.

On Page 280, **Delete** the entire section.

~~**D. Contraction Joints.** For pavement less than or equal to 10 inches (225 mm) thick, saw contraction joints with a standard (water cooled diamond bladed) concrete saw to a minimum depth of one-fourth of the specified pavement thickness. For pavement greater than 10 inches (255 mm) thick, saw contraction joints to a minimum depth of one-third the specified pavement thickness. When cutting joints using a standard (water cooled diamond blade) saw ensure the joint is 1/4 ± 1/16 inch (6 ± 1.6 mm) wide when measured at the time of sawing.~~

~~When using the option of early entry (dry cut, light weight) saws, only use saw blades and skid plates as recommended by the saw manufacturer for the coarse aggregate type being used in the concrete. Perform the early entry contraction joint sawing after initial set and before final set. Saw the contraction joint 2 1/4 to 2 1/2 inches (56 to 63 mm) deep. Ensure any early entry saw joints are approximately 1/8 inch (3 mm) wide at the time of sawing.~~

~~If the pavement is constructed in two or more separately placed lanes, install the joints continuous for the full width of the pavement. Saw the pavement with sawing equipment approved by the Engineer as soon as the saw can be operated without damaging the concrete. Provide saws with adequate guides, blade guards, and a method of controlling the depth of cut. After wet sawing, clean the joint using a jet of water. After dry sawing clean the joint using air under pressure. During sawing of contraction joints, maintain a standby saw in working condition with an adequate supply of blades.~~

451.09.E.

On Page 281, **Replace** the **E. Construction Joints** with **D. Construction Joints**.

455.04.F.

On Page 295, **Delete** item 6.

~~6. Define who will perform the HIPERPAV analysis required in 451.09 and the proposed timeframe the Engineer will have to review the report.~~

455.05.A.3.

On Page 298 **Replace** the first full paragraph with the following:

After the initial curing at the project site and within 72 hours, deliver three (3) QA cylinders to District Testing and three (3) QA cylinders to the AASHTO accredited laboratory for standard curing and testing. Failure to comply with these requirements will be grounds for removal of the AASHTO accredited laboratory from the project at the discretion of the District Testing Engineer and OMM. The AASHTO accredited laboratory will test the QA sample and the QC sample and report the test results on the form accepted by the QCP. Distinguish the QA from the QC results for the sublot.

499.02

On Page 300, **Replace** the materials listing for "Fly ash" with "Fly ash or natural pozzolan".

499.02

On Page 300, **Replace** Portland Cement with the following:
Portland cement…….701.01, 701.02, 701.04, 701.05, 701.09, 701.15 or blended cement[1]

499.03

On Page 301, in Table 499.03-1, **Replace** notes [5] and [7] with the following:

[5] The maximum fly ash, natural pozzolan, or slag cement content may be increased up to 50%.

[7] Cement or a combination of cement and up to 15% fly ash or natural pozzolan; or up to 30% slag cement.

499.03

On Page 301 in Table 499.03-1, **Replace** the *QC SCC* row with the following:

QC SCC [8]	4500 (31.0) at 28 days	1,500 or as per plan	520 (236)	Well-Graded, 1 inch or 3/8-inch nominal size or as per plan

499.03

On Page 301 **Replace** footnote [8] in Table 499.03-1 with the following:

[8] For QC 5 and QC SCC mixes with 3/8-inch nominal size, provide an air content of 8±2%.

499.03

On Page 302, in Table 499.03-2, **Add** the following row after "Fly Ash":

Natural pozzolan	25

499.03.A.

On Page 302, **Add** the following sentence after the second sentence in the first full paragraph:
Water-reducing admixtures conforming to the requirements of 705.12 may also be used or adjusted to meet slump requirements.

499.04.F.

On Page 303, **Replace** the last sentence of the paragraph with the following:
Adjust the absolute volume of the aggregates if the cementitious content is increased.

499.04.H.

On Page 304, **Replace** the entire paragraph with the following:

H. If slump loss occurs before or during placement of the concrete, the concrete slump may be field adjusted to restore plasticity with a Type F or G chemical admixture conforming to 705.12, additional water, or both, only if the maximum water-cementitious ratio of the accepted JMF is not

exceeded. Mix for a minimum of 30 revolutions at mixing speed after addition of admixture, water, or both. Inform the Inspector, record all adjustments, and confirm compliance with 499.03A. The Engineer will recheck the slump and air content to ensure conformance to the specification. If after any adjustment the components of the load are segregated, the Department will reject the load.

499.05

On Page 305 **Add** the following subsection **D.** as follows:

D. Volumetric Truck Mixers. Volumetric Truck Mixers. Provide mixers conforming to ASTM C685, Sections 7, 8, 9, 10, 11, 13, and 14. Mixers must have rating plates indicating that the performance of the mixer is in accordance with the Volumetric Mixer Manufacturer Bureau or equivalent. Mix concrete in accordance with the manufacturer's recommended procedures. The volumetric mixer must be capable of carrying sufficient unmixed dry bulk cement, supplementary cementitious materials, coarse and fine aggregate, admixtures and water, in separate compartments and accurately proportion the approved JMF. Each volumetric mixer shall be equipped with an onboard ticketing system that will electronically produce a record of all material used and their respective weights and the total volume of concrete placed. Place no more than 30 cubic yards (23 m^3) per unit per day. Limit the use of volumetric truck mixers to QC Misc., QC MS, QC FS, and Item 613.

Provide a process control plan, product quality control plan, and manufacturer's recommended procedures to the OMM Cement and Concrete Engineer. Calibrate the proportioning devices before the start of a project and at intervals recommended by the manufacturer. Perform calibrations in the presence of the Engineer. Calibrate the cement and aggregate proportioning devices by weighing (determining the mass of) each component. Calibrate the admixture and water proportioning device(s) by weight (mass) or volume. Batch each material to ensure weights are within the tolerances listed in Table 499.06-2, based on the amount specified in the accepted JMF. Furnish batch tickets in accordance with Item 499.07. Verify yield daily based on the cement meter count (number of revolutions per 94 pounds (42.5 kg) of cement), for each volumetric truck mixer.

499.06

On Page 306 **Add** the following table after Table 499.06-1:

Table 499.06-2 VOLUMETRIC TRUCK BATCHING TOLERANCES

Material	Batching Tolerance (%)
Cement	0.0 to +4.0
Pozzolan	0.0 to +4.0
Carbonate Micro-fines	0.0 to +4.0
Aggregates	±2.0
Water	±1.0
Chemical Admixtures	±3.0

499.07-1

On Page 307 **Add** the following row after "Batch plant location":

Producer/Supplier Code	

499.07

On Page 307, in Table 499.07-1, **Add** the following row after "Fly ash":

Natural pozzolan	lb (kg)

499.07

On Page 308, in Table 499.07-2, **Add** the following row after "Fly ash":

Natural pozzolan		

499.08

On Page 308 **Delete** the 4th and 5th paragraphs of the section.

~~When concrete is delivered in transit mixers and before discharging any of a batch, the Engineer may allow adding water within the specified water-cement ratio limits. Perform sufficient mixing, a minimum of 30 revolutions at mixing speed, to adjust the slump and to regenerate the specified air content throughout the batch.~~

~~When approved by the Engineer, the Contractor may use approved admixtures (705.12, Type F or G) for retempering the load to adjust the slump after the start of discharge. Mix for a minimum of 30 revolutions at mixing speed after addition of the admixture.~~

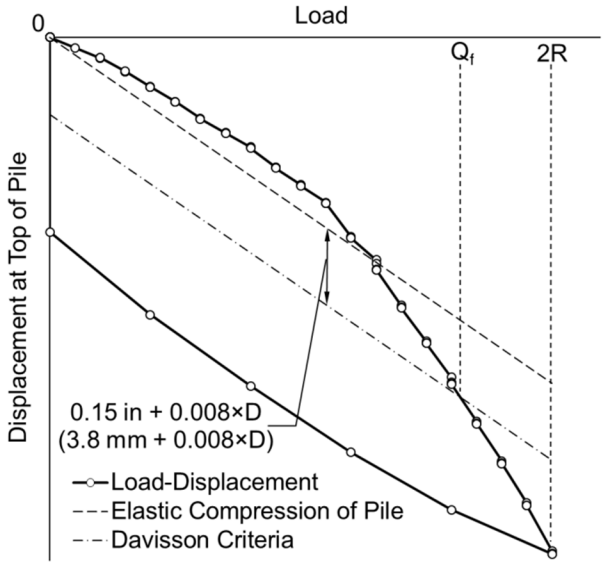
501.04.B

On Page 311, **Add** the following sentence to the end of the first paragraph;

Shop Drawings are not required for elastomeric bearings.

506.03

On Page 327, After the last sentence **Add** the following graphic:



508.02

On Page 334, **Add** the following sentence after the second sentence of the last paragraph:

For phased construction of slab superstructures, do not place concrete for a closure pour until falsework on each side of the closure has been removed.

508.02

On Page 335, **Add** the following sentence to the end of the last paragraph:

Galvanize all deck hangers not encased in concrete per 711.02.

508.05

On Page 336, **Replace** the last paragraph with the following**:**

Include the cost for load testing required as per 508.02 in the item for which the falsework support is used.

509

On Page 336, **Replace** with the following**:**

ITEM 509 CONCRETE REINFORCEMENT

509.01 Description
509.02 Materials
509.03 Care of Material
509.04 Method of Placing
509.05 Bending
509.06 Approval of Placing
509.07 Splicing
509.08 Supports
509.09 Epoxy Coated Reinforcing Steel
509.10 GFRP Reinforcement
509.11 Method of Measurement
509.12 Basis of Payment

509.01 Description. This work consists of furnishing and placing supports, mechanical connectors, tie wires, and uncoated (black), epoxy coated and GFRP concrete reinforcement of the quality, type, size, and quantity designated, including steel dowels.

509.02 Materials. Furnish materials conforming to:

Epoxy coated reinforcing steel	709.00
Reinforcing steel, deformed bars	709.01, 709.03, 709.05
Spiral reinforcing steel	709.01 or 709.08
Bar mats and wire fabric	709.09, 709.10, 709.12
Plastic supports	709.15
GFRP deformed bars	705.28

Do not substitute one type of reinforcement (uncoated, epoxy coated, or GFRP) for another.

For metal bar supports used at or near the surface of the concrete, furnish either galvanized steel, stainless steel, epoxy coated steel or plastic coated steel.

Provide sufficient additional reinforcing steel to replace reinforcing steel removed by the Department for sampling. Replace random samples in the structures with additional steel, spliced according to 509.07.

When providing reinforcing steel for spiral cages, galvanized steel conforming to ASTM A767, Class 1, may be provided only for the spiral reinforcing steel in lieu of epoxy coated reinforcing steel. The galvanized coated reinforcing steel will meet all other requirements of 509. Where a sample splice is needed use the lap length requirements for epoxy coated. The Galvanized coating will be applied after the reinforcing has been fabricated. If the galvanized surface becomes damaged during handling in the field, repairs will conform to ASTM A780. Use bar supports and tie wires which are plastic coated or epoxy coated. Only suppliers certified under S1068 may provide this reinforcing.

509.03 Care of Material. Upon delivery to the project and before use, stack concrete reinforcement off the ground and keep it free from dirt, oil, grease, or avoidable rust. Before placing in the concrete, ensure the reinforcement is clean and free of loose rust.

When handling deformed reinforcement, use equipment that avoids damaging or abrading the bar. Lift bundles of reinforcement at multiple pickup points. Do not drop or drag reinforcement. If stored outdoors for more than 2 months, cover the reinforcing bars with opaque plastic or other types of cover that protect the bars from ultraviolet rays. Prevent exposure of reinforcing bars to temperatures above 120°F during storage.

509.04 Method of Placing. Place concrete reinforcement in the positions shown on the plans, and firmly secure the reinforcement during the placing and setting of concrete. Tie bars in the superstructure at all intersections, except tie bars at alternate intersections where bar spacing is less than 1 foot (0.3 m) in any direction. The Contractor may place up to 25 percent of the upper longitudinal bars in a bridge deck slab beneath the upper transverse bars to support the top mat. Do not drive or force concrete reinforcement into concrete after its initially set.

Welding on reinforcing is prohibited, except as permitted by 709.10 and 709.12. The Engineer will allow the Contractor to fabricate reinforcing bar cages for prestressed beams if fabrication is done in a manner satisfactory to the Director.

Install concrete reinforcement with the following clearances from the concrete surface:

A. 2 1/2 inches [-0 inch, +0.5 inch] (65 mm [-0 mm, +13 mm]) to the top of sidewalks.

B. 3 inches [± 0 inch] (75 mm [±0 mm]) at the faces of footings placed against rock or earth.

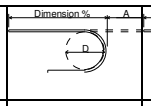
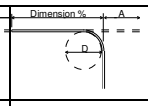
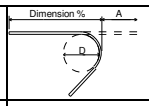
C. 1 1/2 inches [-0 inch, +0.25 inch] (38 mm [-0 mm, +6 mm]) to the bottom of a cast-in-place deck slab.

D. 2 1/2 inches [-0.25 inch, +0.75 inch] (65 mm [-6 mm, +19 mm]) to the top surfaces of cast-in-place concrete deck slabs.

E. 2 inches [-0 inch, +0.5 inch] (50 mm [-0 mm, +13 mm]) at all other surfaces.

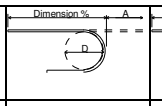
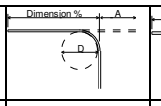
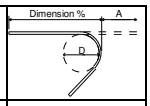
509.05 Bending. Bend concrete reinforcement to the dimensions shown on the plans and in Table 509.05-1 (509.05-1M). Reject concrete reinforcement showing transverse cracks.

TABLE 509.05-1 STANDARD BENDS

	Bar								
	Nominal Dimensions			180° Bend		90° Bend		135° Bend	
Bar	Diameter	Area	Weight	D	A	D	A	D	A
Size	in	in²	lb/ft	in	in	in	in	in	in
3	0.375	0.11	0.376	2 1/4	5	2 1/4	5	1 1/2	4
4	0.500	0.20	0.668	3	6	3	7	2	4 1/2
5	0.625	0.31	1.043	3 3/4	7	3 3/4	8 1/2	2 1/2	5 1/2
6	0.750	0.44	1.502	41/2	8	4 1/2	10		
7	0.875	0.60	2.044	5 1/4	10	5 1/4	12		
8	1.000	0.79	2.670	6	11	6	131/2		
9	1.128	1.00	3.400	9 1/2	15	9 1/2	15 1/2		
10	1.270	1.27	4.303	10 3/4	17	10 3/4	18		
11	1.410	1.56	5.313	12	19	12	20		
14	1.693	2.25	7.65	18 1/4	27	18 1/4	25		
18	2.257	4.00	13.60	24	36	24	33		

Tolerances: For diameter of bends, “D”, the tolerance may be plus or minus the diameter of the bar. Standard fabricating tolerances shall be in accordance with the CRSI Manual of Standard Practice. No weight allowances will be made for tolerances.
Weight applies to steel only.

TABLE 509.05-1M STANDARD BENDS

	Bar								
	Nominal Dimensions			180° Bend		90° Bend		135° Bend	
Bar	Diameter	Area	Weight	D	A	D	A	D	A
Size	mm	mm²	kg/m	mm	mm	mm	mm	mm	mm
#10M	9.5	71	0.560	60	130	60	130	40	105
#13M	12.7	129	0.994	75	155	75	180	50	115
#16M	15.9	199	1.552	95	180	95	215	65	140
#19M	19.1	284	2.235	115	205	115	255		
#22M	22.2	387	3.042	135	255	135	305		
#25M	25.4	510	3.973	150	280	150	345		
#29M	28.7	645	5.060	240	380	240	395		
#32M	32.3	819	6.404	275	430	275	455		
#36M	35.8	1006	7.907	305	485	305	510		
#43M	43.0	1452	11.38	465	685	465	635		
Tolerances: For diameter of bends, “D”, the tolerance may be plus or minus the diameter of the bar. Standard fabricating tolerances shall be in accordance with the CRSI Manual of Standard Practice. No weight allowances will be made for tolerances. Weight applies to steel only.									

509.06 Approval of Placing. Before placing concrete, obtain the Engineer’s approval of concrete reinforcement in place.

509.07 Splicing. Splice reinforcement only as specified or determined by the Engineer. Splice spiral reinforcement by lapping 1 1/2 turns. Do not replace spiral reinforcement removed for a material sample if the sample is from the end of the spiral and less than or equal to 30 inches (0.8 m) long.

Mechanical connectors shall be capable of developing 125 percent of the yield strength of the connected bars. For threaded connections, do not reduce the nominal area of the bars shown in the plans without increasing the grade of the reinforcing bar shown in the plans. The total slip of the bar within the splice sleeve of the connector after loading in tension to 30.0 ksi (207 MPa) and relaxing to 3.0 ksi (21 MPa) shall not exceed the following measured displacements between gage points clear of the splice sleeve:

A. For bar sizes up to No. 14: 0.01 in. (0.25 mm)

B. For No. 18 bars: 0.03 in. (0.76 mm)

Splice Nos. 14 and 18 (Nos. 45M and 55M) reinforcing steel bars with mechanical connectors.

The Department will not permit lap splices for these size bars.

Splice Nos. 14 and 18 (Nos. 45M and 55M) reinforcing steel bars with mechanical connectors. The Department will not permit lap splices for these size bars.

Splice additional steel used to replace random samples as follows:

TABLE 509.07-1

Bar Size	Lap Length (inches)	
	Uncoated	Epoxy Coated
4	22	27
5	29	35
6	34	41
7	43	52
8	57	69
9	72	87
10	92	111
11	113	137

TABLE 509.07-1M

Bar Size	Lap Length (mm)	
	Uncoated	Epoxy Coated
13M	560	690
16M	740	890
19M	870	1040
22M	1090	1320
25M	1450	1750
29M	1830	2210
32M	2340	2820
36M	2870	3480

The Department will not permit mechanical splices for GFRP reinforcement.

509.08 Supports. Use precast mortar blocks, metal supports, or plastic supports of adequate strength, of the proper depth, and in sufficient number to support concrete reinforcement. Space supports for concrete reinforcement no more than 4 feet (1.2 m) apart transversely and longitudinally. Metal supports shall have a shape that is easily enveloped by the concrete.

Mortar blocks may only be used to support the lower matt of reinforcing steel in concrete that is cast directly against bedrock or soil.

509.09 Epoxy Coated Reinforcing Steel. Use plastic coated or epoxy coated bar supports and tie wires to protect the epoxy coating from physical damage, as specified in 709.00, during placement and to prevent electrical coupling between mats. Carefully handle and install bars to perform minimal patching at the job site. Repair physical damage to the epoxy coating with a patching material all damaged coating areas greater than 1/4-inch (6 mm) square or 1/4-inch (6 mm) diameter; approximately 1/8-inch (3 mm) square or 1/8-inch (3 mm) diameter if the opening is within 1/4-inch (6 mm) of an equal or larger opening; or, a length of 6 inches (150 mm) regardless of area. Coating damage in cases where the damaged area is less than specified above need not be repaired. Use patching material of the same composition and quality as the original coating. Prepare the surface to a near white metal.

If repair is required, clean and repair the damaged areas and allow adequate cure time before placing concrete. The Engineer will approve the installation once patching has been done as outlined above.

509.10 GFRP Reinforcement. Secure GFRP reinforcement with plastic- or epoxy-coated tie wire; nylon or plastic zip ties; or thermoplastic injection molded clips. The maximum total unrepaired visible damage on each linear foot of each FRP bar shall not exceed 2% of the surface area in that linear foot of bar. The depth of the permissible damage shall not exceed 0.04 in. (1.0 mm). Replace the damaged bar or lap splice a new GFRP bar adjacent to the damaged portion with the appropriate lap length on either side of the damage. Do not field bend or straighten GFRP bars. Minimum inside bend radii shall conform to the requirements of Table 509.05-1 (509.05-1M)**.** Do not field cut GFRP reinforcement.

509.11 Method of Measurement. The Department will measure Epoxy Coated Reinforcing Steel by the number of pounds (kilograms) shown on the plans. Additional measurements or calculations are not required.

The Department will measure GFRP Deformed Bars by the number of feet (meters) shown on the plans. Additional measurements or calculations are not required.

If the Contractor believes the pay weight or length, as shown on the plans, is in error, the Contractor is responsible to prove this discrepancy by recalculating the total weight or length for the reference number involved. The Contractor shall submit its figures to the Engineer for review and approval. The number of

pounds (kilograms) of reinforcing steel or feet (meters) of GFRP reinforcement shall be the actual number of pounds (kilograms) or feet (meters) of the various sizes incorporated in the concrete as shown on the plans, completed and accepted.

If the weight of the reinforcing steel is recalculated, determine the number of pounds (kilograms) from the number, length, and weight of the bars as shown on the steel list of the plans, based on the weight per foot (meter) shown in the Table 509.05-1 (509.05-1M) with deductions for bars not used, and addition for extra bars used as directed by the Engineer**.**

509.12 Basis of Payment. The Department will not include the supports, mechanical connectors, and tie wires in the calculated weights but will consider them incidental to the price bid.

The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
509	Pounds (Kilograms)	Epoxy Coated Reinforcing
509	Pounds (Kilograms)	Uncoated Reinforcing
509	Feet (Meters)	No.__ GFRP Deformed Bars

511.03

On page 343**, Revise** the first paragraph to the following:

511.03 Concrete. Provide concrete for structures according to 499.03, using Class QC 1, QC 2, QC 3, or QC 4 or QC 5 as specified in the Contract.

511.04

On page 343**, Delete** the third paragraph and table and **Replace** with the following:

When the concrete bid item does not require QC/QA, the Engineer will make at least one set of acceptance test cylinders for each 50 cubic yards (40 m³) of concrete.

511.07

On page 345**, Revise** the following definitions:

f'ci = Compressive strength of prestressed concrete at release; ksi. Use the fabricator's reported strength if beams have been cast, otherwise use strength provided in the Plans.

$$k_{td} = \frac{t}{12\left(\frac{100-4f'_{ci}}{f'_{ci}+20}\right)+t}$$

511.07

On page 345, **Replace** the fourth paragraph with the following:

Provide the Engineer with revised plan sheets and Design Camber calculations or measured camber data signed, sealed and dated by an Ohio Registered Professional Engineer at least 7 days prior to constructing the beam seats. The revised plan sheets shall include the measured camber data (if available), Design Camber (D_t) and beam age (t) assumed for establishing the revised elevations. Provide haunch reinforcement for prestressed I-beam members according to the ODOT Bridge Design Manual, Figure 308-7 as necessary to extend the beam's composite reinforcement at least two inches into the deck thickness. All revisions resulting from adjusted beam seat elevations shall be clearly marked as revised. Do not begin work until the Engineer approves the revised plan.

511.09

On page 350**, Replace** the section with the following:

511.09 Construction Joints. A construction joint is a plane separating concrete placements that reach initial set at different times**.** Place construction joints in the locations shown in the plans. Construction joints shall have a non-finished surface, a formed finish surface or a roughened finish surface. Provide a non-finished surface on horizontal joints and a formed finished on vertical joints unless otherwise specified. A non-finished surface shall have uniformly exposed aggregate, no loose aggregate and all laitance removed. When placing concrete against an existing surface, placed in a previous project, the Department will consider the construction joint created to be a formed finish surface unless otherwise specified in the plans. All construction joint form work and bulkheads shall be in accordance with Item 508. Do not use an edger on construction joint edges. Cure the construction joints according to 511.14.

A roughened construction joint surface, when specified in the plans, shall be as follows:

A. For bonding surfaces that can be finished, finish the surface by producing groves at right angles and penetrating the finished surface approximately 1/4 ± 1/8 inch (6 ±3 mm) at a maximum spacing of 1 -1/4 ±1/4 inch (32 ± 6 mm). Grooves shall terminate approximately 1½-inches from the edge of finishing surface. If the first strike-off does not produce the required roughness, repeat the process before the concrete reaches initial set.

B. For bonding surfaces that cannot be finished according to Part A, use mechanical scarifying equipment to thoroughly roughen the existing surface to a uniformly distributed 1/4 ± 1/8 inch (6 ±3 mm) at a spacing of 1 -1/4 ±1/4 inch (32 ± 6 mm). Do not use chipping hammers heavier than the nominal 15 lb (7 kg) class and operate at an angle of less than 45 degrees with respect to the surface. Remove concrete in a manner that prevents cutting, elongating or damaging reinforcing steel.

Before placing fresh concrete against any hardened concrete surface, thoroughly clean and saturate the existing surface. Remove all loose particles, dust, dirt, laitance, oil, curing compound, concrete lip or edging, and any film of any sort. Flush construction joint surfaces with water and allow the surfaces to dry to a surface-dry condition immediately before placing concrete.

Requests to add, delete or relocate construction joints shall be in accordance with the ODOT Bridge Design Manual and shall be in writing, accompanied by revised plan sheets signed, sealed, and dated by an Ohio Registered Professional Engineer. Obtain the Engineer's acceptance prior to placing a construction joint not shown on the plans. The Department will not pay for added costs that result from such changes.

511.10

On page 350**, Replace** the section with the following:

511.10 Work Stoppage. If the work is unexpectedly interrupted by breakdowns, storms, delays or other causes which will result in an initial set of the placed concrete, rearrange the freshly deposited concrete to provide a straight and non-wavy construction joint per 511.09. If the Engineer determines that this construction joint adversely affects the structure capacity, the Engineer will require a corrective action plan per 501.05.C.

511.15

On page 355, **Replace** the first two paragraphs with the following:

511.15 Surface Finish. For concrete that is to be sealed with Epoxy-Urethane according to 512.03, perform surface profiling and surface finish according to 512.03.F.

For all others, finish the concrete surface as detailed below:

511.15.A.

On page 355, **Replace** the paragraph with the following:

A. Standard Finish. On all surfaces, remove fins and irregular projections with a stone or power grinder, taking care to avoid contrasting surface textures. Repair all cavities produced by form ties and, on visible surfaces, repair all defects using a mortar consisting of one part of hydraulic cement conforming to Item 499 and 1-1/2 parts sand conforming to 703.03, by volume and water conforming to 499.02 with a maximum water/cementitious ratio of 0.4. A defect is an imperfection in the concrete measuring at least 3/4" (19mm) in diameter or at least 1/2" (13 mm) deep but not exceeding a total volume of 1 cubic inch (16.387 mL). Finish all repaired surfaces on the structure in a similar manner and to the extent required to produce a uniform appearance.

511.19.E.

On page 358, **Replace** E. with the following:

E. Portable barrier anchor locations.

511.19.F.

On page 358, **Add** the following after E.:

F. Cracks discovered in the deck of the top and bottom surfaces before opening the deck to traffic, that are 10 mils or 0.010 inches or less in width. For deck cracking on the top and bottom surface area, on more than 20% of the surface area, or that is 10 mils or 0.010 inches or more in width, or deck scaling that is greater than 0.250 inches deep, or on more than 20% of the deck surface area, or deck spalling on more than one area, or an area greater than 32 square yards, an investigation will be performed by OMM and proceed according to 108.02 to resolve the issue.

512.03.F.

On page 364, **Replace** the entire section with the following:

F. Surface Preparation and Profiling.

1. Non-Epoxy Sealer

Remove dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials from surfaces to be sealed.

Ensure that all wastes generated by the surface preparation operation are managed in accordance with 107.19.

If the concrete surface had curing compound applied, acid test the surface after blasting to see if the curing compound was removed. Perform the acid test for every 500 square feet (47 square meters). Use a 30%, by weight, solution of hydrochloric acid. Apply 4 to 5 drops to the concrete surface. If foaming/fizzing occurs the curing compound is removed. Rinse the tested location with an ammonia solution to neutralize the concrete area tested (1 cup ammonia to 5 gallons water).

(NOTE: Muriatic acid and ammonia can be bought in a hardware store. Muriatic acid is used to clean masonry. Only dilute by pouring the acid into the water. DO NOT pour the water into the acid.)

When surfaces show intermittent or no foaming, use chemicals or other cleaning compounds to remove the curing compounds. Only use products approved by the sealer manufacturer. Furnish the Engineer documentation of the sealer manufacturer's approval and method to test if materials are removed.

2. Epoxy-Urethane Sealer

Remove dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials from surfaces to be sealed.

Ensure that all wastes generated by the surface preparation operation are managed in accordance with 107.19.

If the concrete surface had curing compound applied, acid test the surface after blasting to see if the curing compound was removed. Perform the acid test for every 500 square feet (47 square meters). Use a 30%, by weight, solution of hydrochloric acid. Apply 4 to 5 drops to the concrete surface. If foaming/fizzing occurs the curing compound is removed. Rinse the tested location with an ammonia solution to neutralize the concrete area tested (1 cup ammonia to 5 gallons water).

(NOTE: Muriatic acid and ammonia can be bought in a hardware store. Muriatic acid is used to clean masonry. Only dilute by pouring the acid into the water. DO NOT pour the water into the acid.)

When surfaces show intermittent or no foaming, use chemicals or other cleaning compounds to remove the curing compounds. Only use products approved by the sealer manufacturer. Furnish the Engineer documentation of the sealer manufacturer's approval and method to test if materials are removed.

After concrete has cured and forms are removed, use one or both of the following methods to produce a surface profile that feels and looks like 100 grit sandpaper or coarser. Provide the Engineer sandpaper for comparison. Perform the ASTM D7682-12, Method B, Standard Test Method for Replication and Measurement of Concrete Surface Profile Using Replica Putty to obtain a replica coupon of the prepared concrete surface on a flat, test section, on the first day of production, and as requested by the Engineer. With a micrometer, measure the surface profile obtained on the coupon, and provide the coupon to the Engineer.

a. Water blast at 7000 psi (48Mpa) minimum, or

b. Abrasive blast, followed by air brooming or power sweeping, to remove dust and sand from the surface and opened pores, or

c. Use a combination of water blast and abrasive blast.

Install suitable traps, filters, drip pans and other separation devices in the cleaning equipment so oil and other foreign material are not deposited on the surface.

Fill all cavities produced by form ties and other single defects or defected areas with a prequalified trowelable mortar in accordance with Supplemental Specification 843.02 and 843.06. Provide a broom/brush finish to all trowelable mortar patches. Cure the trowelable mortar according to Supplemental Specification 843.07.

A defect is an imperfection in the concrete measuring at least 3/4" (19mm) in diameter or at least 1/2" (13mm) deep but not exceeding a total volume of 1 cubic inch (16.387 mL). A defected area is an area with a density of imperfections between 1/4" (6 mm) and 3/4" (19 mm) in diameter or between 1/4" (6mm) and 1/2" (13 mm) deep numbering 10 or more per 1 square foot (0.09 square meters) area.

Air dry for at least 10 days after completion of the manufacturer's recommended cure time for trowelable mortar. Brush abrasive blast, followed by air brooming or power sweeping, to remove dust and sand from the surface and opened pores.

512.03.G.

On page 365, **Replace** the first paragraph of the subsection with the following:

G. **Application and Coverage**. Do not apply sealer to surfaces with moisture. Determine moisture on surface in accordance with ASTM D4263 - Indicating Moisture in Concrete by the Plastic Sheet Method. Apply the sealer within 48 hours after moisture testing and brush abrasive blast. Do not apply

sealer if rain is anticipated within six (6) hours after application. Clearly mark where the sealer application stops if not continuous.

512.04.B.

On page 368**, Replace** the section with the following:

B. Surface Preparation. Remove roadway dirt and debris from the area of the deck to be treated. Sweep, abrasive blast, then with the use of a manual or power broom sweep and blow with compressed air so that the surfaces to which the sealer is to be applied is dry and free of dust and dirt. Use high pressure compressed air to blow all loose material from visible cracks. Fit the cleaning equipment with suitable traps, filters, drip pans, driers and other devices to prevent oil and other foreign material from being deposited on the surface. Do not allow traffic on the clean surface prior to application of the sealer. Remove existing pavement markings using a method as specified in 614.11.G.1.a. ~~The cost of removal is incidental to the Work.~~ Remove all traces of asphalt or petroleum products and concrete curing seals by abrasive blasting prior to air sweeping.

512.06.B.

On page 371**, Replace** the section with the following:

B. Surface Preparation. First remove roadway dirt and debris from the area to be treated. Sweep abrasive blasted surfaces to which the sealer is to be applied, then manual or power broom swept and blown with compressed air so that they are dry and free of dust and dirt. Use high pressure compressed air to blow all loose material from visible cracks. Use a high pressure water blast followed by an air blast if particles are highly embedded in the cracks, to clean cracks. Fit the cleaning equipment with suitable traps, filters, drip pans, dryers and other devices to prevent oil and other foreign material from being deposited on the surface. Do not allow traffic on the clean surfaces prior to application of the sealer. Remove existing pavement markings using a method as specified in 614.11.G.1.a. ~~The cost of removal is incidental to the Work.~~ Remove all traces of asphalt or petroleum products and concrete curing by the abrasive blasting prior to air sweeping.

512.09

On page 376**, Add** the following paragraph after the last paragraph:

The Department will measure the removal of pavement markings using the same method of measurement as completed markings in the units designated per Item 641.

512.10

On page 376 **Replace** the last paragraph with the following:

The Department will consider the removal of dust, dirt, oil, wax, curing compounds, efflorescence, laitance, and other foreign materials as incidental to the surface preparation of the concrete surfaces to be sealed. When the surface to be sealed contains an existing coating, the Department will consider all materials, equipment and labor to remove the existing coating as incidental to the pay item Removal of Existing Coatings from Concrete. When the surface to be sealed contains pavement markings, the Department will consider all materials, equipment and labor to remove the existing pavement markings as incidental to the pay item Removal of Existing Pavement Marking.

512.10

On page 377, **Add** the following after the last item:

512	Linear Feet or Square Foot	Removal of Existing Pavement Marking

(Meter of Square Meter)
or Each

513.13

On page 383, **Replace** the last sentence of the first paragraph with the following:

Weld stiffeners connected to cross frames and/or diaphragms to the top and bottom flange.

513.15

On page 384, **Replace** the entire section with the following:

513.15 Horizontally Curved Beams and Girders. If members are to be heat curved, submit the detailed procedure, including ~~necessary~~ calculations ~~for geometric limitation criteria, camber adjustment and applied loading,~~ to the Office of Materials Management. Obtain the Office of Materials Management's acceptance of the procedure before starting this work.

Curve beams and girders using heat according to ~~*AASHTO Standard Specifications for Highway Bridges*, except that the fabricator may cut flanges for girders to obtain the required alignment.~~ the *AASHTO-LRFD Bridge Construction Specification.*

513.19

On page 385, **Replace** the ninth paragraph with the following:

The Fabricator shall drill holes full sized in unassembled pieces or connections, including templates for use with matching sub-sized and reamed holes, using suitable numerically controlled (N/C) drilling equipment. If using N/C drilling equipment, demonstrate the accuracy of the drilling procedure to the inspector according to 513.24.

513.24

On page 391, **Add** the following sentence after the last sentence of the fifth paragraph:

The maximum sweep at any point along all members of an expansion joint shall not exceed ¼" in 50'.

513.28

On page 395, **Replace** the second paragraph with the following.

Shop blast unpainted Grade 50W material and main members requiring galvanized coating to SSPC-SP 6, commercial blast. QCP #3 shall apply according to Item 514.

514.10

On page 403, **Replace** the first paragraph with the following:

514.10 Inspection Access and Lighting. In addition to the requirements of 105.10, furnish, erect, and move scaffolding and other appropriate equipment to allow the inspector and the Engineer the opportunity to closely observe all affected surfaces during all phases of the work and for at least 10 workdays after completely painting each structure to allow for the Final Inspection according to 514.21. Provide artificial lighting as necessary to supplement natural light with a minimum of 30 foot candles (325 LUX) at the surface of the steel for inspection, cleaning, and painting. Prevent glare that interferes with traffic, workers and inspection. Submit fully detailed Engineered Drawings of the scaffolding or work platforms used for inspection access to the Engineer at least 14 days before installation. All details of the inspection access shall comply with the applicable safety requirements of The Ohio Industrial Commission and OSHA. Provide details and locations of all connections, to the permanent structure, used for painting and inspection of the structure with the Engineered Drawings. Damage to the permanent structure shall be avoided. Do not drill into the bottom of the deck or under bearing locations or similar areas of concern for the structure. The details shall be

reviewed, signed, stamped and dated by an Ohio registered Professional Engineer certifying that they meet these requirements. The Engineer will provide a written response to the submittal in accordance with 105.02. Do not begin work until the Engineers acceptance has been received. Perform all work in accordance with the accepted Engineering Drawings. Immediately cease all operations that deviate from the accepted Engineered Drawings. If a deviation is necessary, prepare revised Engineering Drawings as noted above and furnish the Engineer a copy of revised Engineering Drawings. Do not begin work until the revised drawings are accepted by the Engineer. Maintain the in-place inspection access equipment employed during original painting activities or provide alternate inspection equipment such as platform lifts, bucket trucks, snooper trucks, or equivalent as approved by the Engineer. If scaffolding, or any hanger attached to the scaffolding, is supported by horizontal wire ropes, or if scaffolding is directly under the surface to be painted, comply with the following requirements:

514.17.C

On page 411, **Replace** the first paragraph of section with the following.

C. Additional Information Pertaining to Shop Applied Paint. Apply a prime coat to all structural steel surfaces by brush or spray methods, including insides of holes, behind stiffener clips, areas that are to be embedded in concrete and contact surfaces of connection, and splice material that is to be fastened with bolts in the shop or field. For ASTM A709 Grade 50W and 70W steel embedded in concrete diaphragms, apply a prime coat to the entire surface area encased within the diaphragm and extending at least 12-in outside the diaphragm. Apply a mist coating from 0.5 to 1.5 mils (12.5 to 37.5 μm) on surfaces within 2 inches (50 mm) of field welds other than those attaching intermediate or end cross frames to beams or girders. Apply one coat of primer to pins, pin holes, and contact surfaces of bearing assemblies, except do not paint those containing self-lubricating bronze inserts. Once the prime coat is dry, apply erection marks, using a thinned paint of a type and color that is completely concealed by, and compatible, with the second coat.

515.06

On page 423 **Replace** the section with the following:

515.06 Shop Drawings. Provide shop drawings conforming to 501.04 and the following requirements.

Include all details, dimensions, dimensional tolerances, and size of materials, lifting devices, inserts, reinforcing steel supports, fabricator incorporated reinforcing, contractor supplied items, piece mark diagrams for field connection and erection of any steel and all prestress members, and all other information necessary for the complete fabrication and erection of the prestressed members. Show all items that will be incorporated into each prestressed member, including Contractor supplied hardware. All steel hardware to be incorporated into the prestressed member and added after Contract Sale shall be galvanized according to 711.02; and meet clearances specified in 509.04.

Provide mill certs to the fabricator, prior to the prefabrication meeting.

Provide the detensioning procedure and pattern conforming to 515.16.

515.10

On page 424, **Add** the following sentence after the last sentence in the section:

Verify casting bed losses annually and provide the data as an update to the Fabricator's Quality Control Plan.

515.15

On page 426, **Replace** the section with the following:

515.15 Concrete. The fabricator shall provide concrete mix designs to Office of Materials Management. The submittal will include:

A. Test data showing the mix achieves the required 28-day strength when cured by methods used for member fabrication. The strength of the concrete for the mix design approval and during production is determined using a set of ~~two, 6 × 12-inch cylinders or~~ three, 4 × 8-inch cylinders.

B. w/c ratio (maximum =0.40)

C. A design and maximum slump. For SCC concrete, provide a slump flow range in accordance with ASTM C1611, provide the following:

a. Visual Stability Index (VSI) – Provide a VSI of 0 or 1 as listed in ASTM C 1611 for acceptance of the mix design

b. J-Ring- Test J-ring passing ability in accordance with ASTM C 1621. The measured difference between the slump flow and J-ring flow must be two inches or less to be acceptable.

c. Static Segregation- Test for static segregation according to ASTM C 1712. The measured penetration must be one-half inch or less to be acceptable.

d. Column Segregation- Test for column segregation according to ASTM C 1610. Provide a static segregation ≤15.0%.

D. Test data showing the mix design achieves 2000 coulombs or less at 90 days when tested according to AASHTO T277. Use samples for the test that were mixed without corrosion inhibitors and that were cured with the same methods that will be used to produce the prestressed concrete bridge members. Do not apply additional cure to samples that have reached the required design strength.

Changes in proportioning, cement, pozzolans or aggregate will require retesting and resubmittal. Office of Materials Management may waive the retests. Provide the waiver request in writing and include all information for the new mix design and a comparison to the previously tested and approved mix design(s).

Deliver concrete according to Item 499 except that 499.03 and 499.04 does not apply. The plastic air content of the concrete before placement shall be 6 ± 2 percent. If the Department questions the concrete's placed air content, obtain cores from the prestressed member and have hardened air testing performed by an independent testing lab acceptable to the Department. Beams with hardened air contents below 4 percent will be rejected. Add an approved corrosion inhibiting admixture at the approved dosage and document the dosage that has been incorporated into each batch of concrete.

Maintain the mix design slump during production. Segregation of the mix is not acceptable. Do not exceed the maximum water-cement ratio during concrete production. When using admixtures to increase the slump, use Type F or G as described in 705.12. Do not use calcium chloride or admixtures containing calcium chloride.

Sample and test the conventional or SCC concrete for prestressed concrete members as specified in Table 515.15-1. For SCC mixes, perform slump flow in accordance with ASTM C 1611 and provide a VSI of 0 or 1. Fabricate test specimens in accordance with ASTM C 1758 per Table 515.15-1. Perform ASTM C 1621 and C 1712 at least once per bed line, per day, during concrete production, and within the tolerances listed in 515.15.C.

TABLE 515.15-1, TEST SPECIMEN REQUIREMENTS[1]

Cubic Yards per Bed	Sampling Frequency	Number of Cylinders Required
Less than or equal to 30 cubic yards	First and last load per bed	Minimum of 4
30 to 60 cubic yards	First and last load per bed plus one random sample.	Minimum of 6
Greater than 60 cubic yards	First and last load per bed plus 2 random samples.	Minimum of 8

Determine strength, for both strand release and final shipping, by testing a group of cylinders, which consists of one cylinder from every sample location. Each group of cylinders shall have an average strength of what is specified in the shop drawings, and no individual cylinder shall have less than 95 percent of the specified strength.

The inspector may require additional cylinders from locations were the concrete does not conform to mix design or placement requirements. Include these additional cylinders in the group of cylinders for determining release and final strength.

The fabricator may place concrete in the bottom flange of a box beam before placing the interior forms and reinforcement for the upper portion of the member, provided continuous concrete placement is not interrupted for more than 45 minutes.

Screed the top surfaces of non-composite members and finish the surface with a burlap drag or other means to provide a uniform surface with a gritty texture suitable for waterproofing.

Screed the top surface of composite members and finish the surface with a wire broom, in a transverse direction and penetrating the finished surface approximately 1/4 inch (6 mm) + 1/16 inch (1.5 mm) – 1/8 inch (3 mm) at a maximum spacing of 1 -1/2 inches (38 mm).

Immediately after final concrete placement and surface finishing, protect the concrete surface with a suitable enclosure until application of live steam or radiant heat. Assure the enclosure's ambient temperature is at least 50 °F (10 °C). Assure the plastic concrete's temperature before initial set doesn't rise more than 10 °F (5 °C) per hour. Limit the total rise before initial set to less than 40 °F (22 °C) and the maximum temperature to 100 °F (38 °C). Record the times and concrete temperatures before initial set.

For curing with low-pressure steam, do not apply live steam directly onto the concrete forms if it causes localized high temperatures.

For accelerated curing with radiant heat, apply radiant heat using pipes circulating steam, hot oil, or hot water, or using electric heating elements. Minimize moisture loss by covering all exposed concrete surfaces with plastic sheeting, 705.06, or by applying a liquid membrane curing compound, 705.07, to all exposed concrete surfaces. Before bonding field-cast concrete or other materials in the finished structure, remove the curing compound from the shear faces of composite members and other surfaces.

Start initial application of the steam or heat 2 to 4 hours after final concrete placement. If using retarders, start applying the steam or heat 4 to 6 hours after final concrete placement. If determining the time of initial set according to ASTM C 403, these time limits do not apply. Record and report the actual time of concrete placement of the last load, placement of enclosure and initial set time.

Apply live steam or radiant heat so the ambient temperature within the curing enclosure does not gain more than 40 °F (22 °C) per hour until reaching the curing temperature. Do not exceed 160 °F (71 °C). Only use a maximum temperature of 180 °F (82 °C) if the fabricator documents to the

Department that delayed ettringite or alkali silica reaction is not at issue. Maintain the maximum curing temperature until the concrete has reached the required release strength. De-tension the strands immediately upon completing the accelerated curing. Keep a record of the time the application of heat began and curing temperatures throughout the entire curing process.

Provide a final surface finish free of bug holes, honeycombing, and other defects. Neatly fill cavities in the exposed surface of beams with mortar of the same cement and fine aggregate mixed in the same proportions as used in the concrete being finished.

Clean the concrete and apply and cure the grout according to the manufacturer's published recommendations. Reject beams with honeycombing that impairs the member's performance. Follow the requirements of Item 512.03 for beams to be sealed with epoxy urethane.

516.03

On Page 433, **Replace** the first paragraph with the following:

516.03 Coating. Coat exposed steel bearings attached to structural steel to match the coating of the adjoining structural steel. Metallize bearings with 100 percent zinc wire or galvanize bearings according to 711.02 that are to be attached to concrete beams. Repair damage to metallized or galvanized coatings according to 711.02.

516.03

On Page 433, **Replace** the second paragraph with the following:

Coat metal parts of expansion joints not part of extensions to existing steel expansion joints with metalized 100 percent zinc wire or galvanize according to 711.02. Prepare the surface to be coated and apply coating as required by The Society of Protective Coatings SSPC-CS-23.00(1). Apply coating to a minimum thickness of 6 mils. The vertical extensions to existing steel expansion joints are not to have any protection and the horizontal extensions to existing steel expansion joints are to match the existing protection.

516.08

On page 436, **Replace** the section with the following:

516.08 Method of Measurement. The Department will measure the specified items by the number of each, square feet (square meters), pounds (kilograms), or feet (meters).

For all Structural Steel Expansion joints, elastomeric compression seals and joint sealer, the Department will measure the length in feet horizontally along the joint centerline and between the outer limits of the joint.

For the Semi-Integral Abutment Expansion Joint Seal, the Department will measure, in feet, the total length of the joint between the diaphragm and the abutment.

For deck resurfacing, the Department will measure Structural Steel Expansion Joints extending vertically by the actual horizontal length of joint.

516.09

On page 436, **Delete** the following pay item:

~~516 Foot (Meter) Folder Copper Strip~~

517.07

On page 438, **Replace** the entire section with the following:

517.07 Method of Measurement. The Department will measure Railing by the number of feet (meters) of railing including end posts. If deep beam guardrail is used, the Department will measure the length of railing between the first posts off the bridge excluding the first posts off the bridge. If hand rails or tubular backup rails are used, the Department will not measure any portions extending beyond the first posts off the bridge. If twin steel tube bridge railing is used, the Department will measure the length of the railing between the second post off the bridge including the second post. If Three Steel Tube Bridge Railing is used, the Department will determine the number of feet of railing as the total length of the middle tube railing as measured along the traffic face on each side of the bridge.

518

Beginning on page 438 **Replace** the section with the following:

ITEM 518 DRAINAGE OF STRUCTURES

518.01 Description
518.02 Fabrication
518.03 Materials
518.04 General
518.05 Porous Backfill
518.06 Prefabricated Geocomposite Drain (PGD)
518.07 Pipe
518.08 Scuppers
518.09 Excavation
518.10 Method of Measurement
518.11 Basis of Payment

518.01 Description. This work consists of constructing drainage systems.

518.02 Fabrication. Fabricate scuppers according to Item 513. Select a fabricator that is at least pre-qualified at level SF. The Department will base final acceptance of all fabricated members on the Engineer's approval that the fabricated items can be successfully incorporated into the structures. Submit mill test reports for structural steel, steel castings, bronze, and sheet lead certified according to 501.06.

518.03 Materials. Furnish materials conforming to:

Scuppers, structural steel and cast steel	513
Metal pipe	707
Plastic pipe	707.33, 707.45
Other metals	711
Prefabricated Geocomposite Drain (PGD)	712.16
Geotextile fabric, Type A	712.09
Reinforced thermosetting resin pipe	707.80

Furnish pipe specials of a grade at least as high as the type of pipe specified.

Furnish porous backfill consisting of gravel, stone, or air-cooled blast furnace slag, with a No. 57 size gradation according to Table 703.01-1. The sodium sulfate soundness loss shall not exceed 15 percent.

Furnish ACBFS conforming to Supplement 1027.

518.04 General. As shown on the plans, connect all parts to new or existing sewers or other outlets.

When installing to superstructure, take into account the deflection of spans under full dead load.

518.05 Porous Backfill. Place porous backfill as shown on the plans. When not shown on the plans, place backfill at least 2 feet (0.6m) thick behind the full length of abutments, wing walls, and retaining walls. Measure the thickness of porous backfill normal to the abutment or wall face. The Contractor may leave undisturbed rock or shale within 18 inches (0.5 m) of the abutment or wall. Place 2 ft^3 (0.23 m^3) of bagged No. 3 aggregate at each weep hole to retain the porous backfill. Place the porous backfill for the full width of the trench and extend it to the bottom of the approach slab or base, as shown in the plans. Place porous backfill in loose lifts not to exceed 12 inches. Run a plate compactor or tamper over the top of each lift for consolidation of approximately 85% of original layer thickness. If placed in loose lifts greater than 12 inches, flood the porous backfill at the appropriate moisture content for consolidation of approximately 85% of original layer thickness.

518.06 Prefabricated Geocomposite Drain (PGD) Do not use PGD on Integral Abutments or above the beam seat elevation on Semi Integral Abutments.

A. Preparation. Prepare the surface of the wall or abutment, on which the PGD is to be placed, to be free of soil, debris, and excessive irregularities that prevent continuous contact between the wall surface and the PGD.

B. Placement. Place PGD strips to provide continuous coverage over the face of the wall. Unroll PGD directly onto the prepared surface. Do not drag the PGD across the ground. Tension the PGD to remove any creases or wrinkles. Do not expose PGD to weather or direct sunlight for longer than 5 days. Place the geotextile fabric side to face toward the backfill or retained soil.

Construct the PGD in horizontal or vertical courses. Place the PGD in direct contact with the wall and secure to the surface using either adhesives per manufactures recommendation or nails as follows. Secure with 2 inch (51 mm) or longer concrete nails along with washers or wood battens of not less than 9 square inches (5887 square mm). Space the concrete nails no more than 3 feet (0.9 m) apart, both horizontally and vertically. Use at least one horizontal row of nails in each horizontal course of PGD, or use at least one vertical column of nails in each vertical course of PGD. Do not affect the drainage area and the downward flow in the drain by the adhesive or fasteners.

C. Splicing and covering. Form horizontal or vertical seams between courses by utilizing the flap of geotextile extending from one course and lapping over the flap on that of the next course. Securely fasten the overlapped flaps with a continuous strip of 3 inch (76 mm) wide, waterproof, plastic tape.

Where splices are necessary without a geotextile flap, place and center a 12 inch (0.3 m) wide continuous strip of geotextile over the seam and fasten with continuous strips of 3 inch (76 mm) wide, waterproof, plastic tape.

As an alternative method of splicing, either horizontally or vertically, rolls of PGD may be joined together by turning back the geotextile flap at the roll edges and interlocking the drainage core approximately two inches. Fold the flap under and tape it beyond the seam with 3 inch (76 mm) wide, waterproof, plastic tape. Shingle lap the core and fabric in the direction of water flow.

To prevent soil intrusion, cover all exposed edges of the PGD core by tucking the geotextile flap over and behind the core edge. Alternatively, a 12 inch (0.3 m) wide strip of geotextile may be used to wrap the edge, taping it to the geotextile side 8 inches (203 mm) in from the edge with a continuous strip of 3 inch (76 mm) wide, waterproof, plastic tape and folding the remaining 4 inches (102 mm) over and behind the core edge. Caps (bottom, top, or end) provided by the manufactures can also be used according to manufacturer's instructions.

Construct all seams, splices, and caps to prevent the backfill material from entering the PGD.

D. Connecting to Weep Holes and Drainage System. Connect the PGD to the drainage system as shown on the plans or per manufacturer's recommendations if not shown in the plans. Maintain a positive outlet for the water in the PGD at all locations.

Do not seal, block or restrict weep holes with the PGD. If available, use weep hole fittings provided by the manufacturer and installed to the manufacturer's instructions. If the PGD core is not perforated at the weep hole location, make a hole in the PGD core matching the diameter of the weep hole or larger to accommodate the pipe or fitting. When making holes in the core, do not damage the geotextile fabric.

Use manufacturer provided outlet fittings that transition between the PGD and the outlet pipe, and prevent material from entering the outlet pipe. If manufacturer fittings are not available, provide smooth-lined or corrugated outlet fittings according to manufacturer's recommendations. Fasten and seal outlet fittings to the wall drains according to manufacturer's recommendations.

E. Repair. Patch or replace damaged PGD. Remove the damaged area and place a PGD patch and splice the edges according to 518.06.C. If the damaged portion is larger than 50 percent of the PGD roll width, cut across the entire width of the roll to remove the damaged portion and splice according to 518.06.C.

If damage is limited to tears in the geotextile fabric, place a geotextile patch extending 6 inches (152 mm) beyond the damaged area in all directions or to the edge of the roll, and seal the entire perimeter with 3-inch (76 mm) wide, waterproof, plastic tape.

Replace and repair damaged PGD at no additional expense to the Department.

F. Backfilling. Replace or repair any PGD component that is damaged during the backfilling operation. Use hand operated compaction equipment to compact the backfill within 1-foot (0.3m) of the PGD.

518.07 Pipe. For drain pipe leading down from the superstructure, use either galvanized steel pipe, 748.06, or plastic pipe, 707.45, or reinforced thermosetting resin pipe, 707.80. Provide specials, elbows, tees, wyes, and other fittings essential for a complete and satisfactory installation of the same material and quality as the pipe. Construct watertight joints of adequate strength. In steel pipe, weld joints or use clamp-type couplings having a ring gasket. In plastic pipe, make joints according to the applicable ASTM standard. In reinforced thermosetting resin pipe, make joints according to manufacturer guidelines and procedures. Securely fasten the pipe to the structure with hanger or clamp assemblies that are galvanized according to 711.02.

Place subsurface pipe as shown in the plans. If the plans require drainage pipe in the porous backfill, provide plastic pipe conforming to 707.33.

For corrugated metal pipe, perforated specials are not required and the Contractor may make bends with adjustable elbows conforming to the thickness requirements of the pipe specifications.

518.08 Scuppers. Construct secure and watertight connections, including the connections to adjacent concrete. Provide castings, true to form and dimension. Weld the joints of structural steel scuppers. Galvanize scuppers according to 711.02.

518.09 Excavation. Excavate all material encountered to the dimensions necessary to provide ample space at least to install pipe or other drainage facility behind abutments and for outlets.

518.10 Method of Measurement. The Department will measure Porous Backfill and Porous Backfill with Geotextile Fabric, by the number of Square Yards (Square Meters), Cubic Yards (Cubic Meters) or lump sum. The Department will measure Prefabricated Geocomposite Drain by the number of Square Yards (Square Meters) or lump sum. The Department will measure pipe specials by the same method as the pipe. If pipe is by the foot (meter), the Department will measure the pipe along its centerline.

The Department will measure all Square Yard (Square Meters) items as the area of the abutment or wall being covered for drainage.

518.11 Basis of Payment. The cost to backfill, if not separately itemized in the Contract, and excavation is incidental to the drainage facility that necessitates them.

The Department will include bagged aggregate with porous backfill for payment.

The Department considers all items to place the Prefabricated Geocomposite Drain including surface preparation, tape, fasteners, adhesives, outlet fittings or other support material, incidental to the Prefabricated Geocomposite Drain.

The Department will pay for perforated and non-perforated pipes for the Prefabricated Geocomposite Drain as separate pay items per 518.07.

The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
518	Cubic Yard (Cubic Meter) Square Yard (Square Meter) or Lump Sum	Porous Backfill
518	Cubic Yard (Cubic Meter) Square Yard (Square Meter) or Lump Sum	Porous Backfill with Geotextile Fabric
518	Square Yard (Square Meter) or Lump Sum	Prefabricated Geocomposite Drain
518	Foot (Meter)	___ inch (___ mm) ___ Pipe, Including Specials
518	Each	Scuppers, Including Supports
518	Pound or Foot (Kilogram or Meter)	Trough Horizontal Conductors
518	Pound or Foot (Kilogram or Meter)	Pipe Horizontal Conductors
518	Foot (Meter)	___ inch (___ mm) Pipe Downspout Including Specials

519.04

On Page 441 **Replace** the second sentence of the last paragraph with the following:

Thoroughly clean the surface of the area to be patched and all exposed reinforcing steel of all dirt, dust, all loose rust or other foreign materials with water, air under pressure, or any other method that produces satisfactory results.

520

On Page 442 **Replace** the entire section with the following:

ITEM 520 PNEUMATICALLY PLACED CONCRETE- SHOTCRETE

520.01 Description
520.02 Materials
520.03 Shotcrete Mix Design.
520.04 Delivery of Materials.
520.05 Storage of Materials.

520.06 Equipment.
520.07 Submittal Requirements.
520.08 Removal of Concrete.
520.09 Reinforcement.
520.10 Blast Cleaning of Repair Area.
520.11 Preconstruction Testing.
520.12 Shotcrete Placing.
520.13 Curing.
520.14 Inspection and Testing
520.15 Method of Measurement
520.16 Basis of Payment

520.01 Description. This work consists of removing all loose and disintegrated concrete; surface preparation; furnishing and placing reinforcing steel, welded steel wire fabric, and dowels; furnishing and placing pneumatically applied concrete; and curing for new work, rehabilitation, or repair.

520.02 Materials. Furnish materials conforming to:

Reinforcing steel	509
Portland cement	701.01 through 701.05, 701.09
Micro-silica	701.10
Fly ash	701.13
Slag Cement	701.11
Fine aggregate	703.02, 703.03
Air-entraining admixture	705.10
Chemical admixture for concrete	705.12
Welded steel wire fabric	709.10 or 709.12
Swedged anchor bolts	711.10

Use water for concrete mixing free from sewage, oil, acid, strong alkalis, vegetable matter, clay, and loam. Potable water is satisfactory for use in concrete. Non-potable water will meet the requirements of ASTM C 1602. Water from a reclaiming system will contain no more than 0.06% chlorides. Test the non-potable and reclaiming system water prior to the start of shotcrete production. Provide certified test data to the Engineer, at least 21 days prior to shotcrete production.

520.03 Shotcrete Mix Design. Only use mix designs accepted by the Department and the following requirements.

A. Provide a Shotcrete job mix conforming to the following:

1. Compressive strength. Provide a compressive strength, at a minimum, of 2000 psi at 3 days, and 4000 psi at 7 days, or as per plan requirements.

2. Migrating Corrosion Inhibitors. Each admixture shall be accompanied by manufacturer's written certification meeting ASTM C 1582. Dosage rate will follow manufacturer's recommendations.

~~3. Corrosion Inhibitor grease. Use corrosion inhibitor (grease) conforming to the following:~~

~~3.1.1. Drop point 300 ºF (149 ºC) minimum by ASTM D 566.~~

~~3.1.2. Flash point 300 ºF (149 ºC) minimum by ASTM D 92.~~

~~3.1.3. Water content 0.1% maximum by ASTM D 95.~~

~~3.1.4. Rust test – Rust Grade 7 or better after 720 hours, aggressive conditions: Rust Grade 7 or better after 1000 hours by ASTM B 117 and ASTM D 610.~~

~~3.1.5. Water soluble ions.~~

~~Chlorides – 10 ppm maximum – by ASTM D 512~~

~~Nitrates 10 ppm maximum – by ASTM D 3867~~

~~Sulfates 10 ppm maximum – by APHA 427D (15th ED)~~

~~3.1.6. Oil separation – 0.5% by weight maximum at 160 ºF (71 ºC) by FIMS 719B, Method 321.2.~~

~~3.1.7. Soak test – 5% Salt Fog at 100 ºF (38 ºC), 5 mils (0.13 mm) (Q Panel Type S), immerse panels in 50% salt solution and expose to 5% Salt Fog – no emulsification after 720 hours by ASTM B 117 Modified.~~

B. Provide prepackaged shotcrete materials in accordance with ASTM C 1480 from a single manufacturer. The minimum compressive strength for shotcrete is 2000 psi at 3 days and minimum of 4000 psi at 28 days. Follow the manufacturer's recommendations for storing the material on site, do not allow the prepackaged materials to become wet prior to use. Submit certified test data to the Engineer for approval prior to use that and meets the requirement of Table 520.3.B-1.

Table 520.3.B-1, SHOTCRETE CONCRETE PROPERTIES

Hardened Properties	**Test Method**	**Requirement**
Slant Shear Bond Strength @ 28 days	ASTM C 882 Modified (1)	2000 psi (14 MPa), min.
Drying Shrinkage @ 28 days	ASTM C 157 Modified (2)	0.08%, max.
Rapid Chloride Permeability @ 28 days	ASTM C 1202 (3) / AASHTO T 277(3)	750 coulombs, max.
Volume of Permeable Voids @ 28 days	ASTM C 642(3)	10%, max.
Freeze-Thaw Resistance @ 300 cycles	ASTM C 666, Procedure A	95% RDM, min.
Flexural Strength @ 28 day	ASTM C 78	900 psi (6 MPa), min.
Compressive Strength @ 3 days	ASTM C 1604	2000 psi (14 MPa), min.
Compressive Strength @ 28 days	ASTM C 1604	4000 psi (28 MPa), min.

(1) No epoxy bonding agent used.
(2) ICRI Guideline No. 03733, "A Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces", 1"x1"x10" prism, air cured
(3) Either Rapid Chloride Permeability or Volume of Permeable Voids can be used.

Provide dry mix with migrating corrosion inhibitors. Each admixture shall be accompanied by manufacturer's written certification meeting ASTM C 1582. Dosage rate will follow manufacturer's recommendations.

520.04 Delivery of Materials. Deliver all materials in their original containers bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name, and quantity. Each shipment will be accompanied by a Safety Data Sheet (SDS).

520.05 Storage of Materials. Stock and store any material necessary to perform the work to prevent damage by the elements. Keep the storage space clean and dry per Manufacturer's recommendations

520.06 Equipment. Provide shotcrete equipment capable of delivering the premixed material accurately, uniformly and continuously through the delivery hose.

A. Mixing: Provide dry-mix shotcrete using a rotary type or pressure vessel gun with a continuous-type predampener, capable of thoroughly mixing the shotcrete mixes in sufficient quantity to maintain shotcreting continuity and a moisture range of 3 to 5% prior to discharging into the gun. Operate all equipment in accordance with the manufacturer's recommendations.

Provide wet-mix shotcrete using a positive displacement pump (swing tube). Concrete for wet-mix shotcrete placement may be supplied by an approved concrete batch plant and delivered by truck concrete mixers. Supply plant batched concrete and delivery equipment meeting the requirements of ASTM C 94. Where the concrete mixture is prepared on-site, use mixing equipment with a calibrated water meter capable of mixing prepackaged shotcrete material. Supply concrete mixes used in shotcrete placement having a W/Cm ratio between 0.35-0.45. The maximum 90-minute limit will be implemented for wet-mix shotcrete after the addition of water to the mixture. Use of hydration control admixtures (HCA) may be used to extend the 90 minutes as approved in the job mix approval prior to use.

B. Air Pressure, Dry-Mix Process. Use a compressor ~~or blower~~ capable of delivering a sufficient volume of oil-free air at the pressure shown in Table 520.6.B-1. Maintain steady pressure throughout the placing process.

Use a water pump or a water booster pump with the size and capacity to deliver water to the nozzle with a pressure at least 15 psi more than the required air pressure.

The values shown in the Table 520.6.B-1 are based on a hose length of 150 feet with the nozzle less than 25 feet above the delivery equipment. Increase operating pressure approximately 5 psi for each additional 50 feet of hose and approximately 5 psi for each 25 feet the nozzle is raised.

TABLE 520.6.B-1, COMPRESSOR CAPACITIES

Compressor Capacity, CFM	**Hose Diameter, in.**	**Maximum Size of Nozzle Tip,** in.	**Operating Air Pressure Available, psi**
250	1	3/4	40
315	1-1/4	1	45
365	1-1/2	1-1/4	55
500	1-5/8	1-1/2	65
600	1-3/4	1-5/8	75
750	2	1-3/4	85

C. Air Pressure, Wet-Mix Process. Use a compressor ~~or blower~~ capable of delivering a sufficient volume of oil-free air to operate the pump at a line pressure between 100 psi and 300 psi. Use delivery hoses between 1-1/2 inches and 3 inches in diameter. Use mixing equipment capable of thoroughly mixing the materials in sufficient quantity to maintain continuous placement.

520.07 Submittal Requirements. Submit to the Engineer for review at least two weeks before beginning the work.

A. Evidence the contractor has successfully executed no less than five projects with similar size and scope over the last five years. The information provided is to include a statement of the type of work, and contact information for Engineer or Owner who have knowledge of the execution of the work and present condition of the work.

B. Documentation and owner references, verifying the qualifications of the nozzlemen. Personnel designated as nozzlemen on the job are required to document a minimum of one year of experience in the application of shotcrete on a comparable project and hold a current certificate for ACI Shotcrete Nozzleman, either dry-mix process or wet-mix process, as corresponds to the process indicated. Certifications for all nozzlemen to be utilized on the job.

C. Documentation the supervisor has experience supervising more than one comparable project including written documentation and owner references, verifying the qualifications.

D. JMF information and a list of materials and quantities. Include list of Admixture literature used. Indicate the admixture type and the manufacturer's recommendations for mixing the admixtures with JMF.

E. Methods and materials used for Depth control quality measures.

520.08 Removal of Concrete. In areas to be repaired, remove all loose, soft, honeycombed, and disintegrated concrete, plus a minimum of 1/4 inch (6 mm) to a maximum of 1 inch (25 mm) depth of sound concrete. Remove additional concrete as necessary to permit the placement of the minimum specified shotcrete thickness of not less than 1-1/2 inches (38 mm), except on top horizontal surfaces of not less than 3/4 inch (19 mm). Once initial removals are made, undercut all exposed reinforcing bars. Undercutting will expose the full circumference of the exposed reinforcing bar. Provide a clearance of 3/4 inch (19 mm) between the exposed reinforcing bar and the surrounding concrete.

Remove all heavy corrosion and scale from the reinforcing bars with wire brush or abrasive blasting. A minor amount or tightly adhered rust may be left in place.

Saw cut edge locations to a minimum of 1/2 inch (13 mm). Maintain an edge location depth of not less than the specified minimum depth for all repair areas.

Only use pneumatic, hand tools, or hydrodemolition equipment to obtain results satisfactory to the Engineer in the removal of concrete and in preparing and shaping the areas to be repaired.

If working around reinforcing steel, avoid loosening the steel, or shattering the concrete around it, beyond the repair area.

520.09 Reinforcement. For existing reinforcing bar that have been cut or having lost 20% or greater section loss, splice in supplement reinforcing bar of equal bar size. Use mechanical rebar slicing system for supplemental reinforcing bars.

Place deformed wire fabric in all vertical surface areas where the thickness of the shotcrete patch is greater than1 1/2 inches (38 mm) or bottom side of horizontal surfaces. Repairs areas on the top of horizontal surfaces do not require deformed wire fabric. Reinforce patches with deformed wire fabric

meeting either 2 x 2 inches (50 x 50 mm) with wire size number D 0.9 (MD 6), or 3 x 3 inches (75 x 75 mm) with wire size number D 1.4 (MD 9). Cover the entire area of the repair with deformed wire fabric, place the wire fabric no closer than ½ inch (13mm) to the prepared surface and not less than 1 inch (25 mm) from the finished surface. Overlap adjacent sheets of deformed wire fabric by 6 inches (150 mm), and securely tie them together. Carefully pre-bend fabric before installation to fit around corners and into re-entrant angles. Rolled wire fabric is prohibited. Wire fabric held in place by elastic force (spring-loaded) or by friction is prohibited.

The deformed wire fabric can be tied to the existing reinforcing bars if there is a 3/4 inch (19 mm) clearance around the bar. The maximum anchor spacing for the deformed wire fabric is 18 inches (46 cm) on center, in all horizontal for vertical surfaces and 12 inches (30 cm) in all horizontal for bottom vertical surfaces, overhead. A minimum of 3 anchors are required for each repair area. Unless specified on plans use 3/8 inch (10 mm) swedged anchor bolts. Embed anchors to manufactures recommendation to develop full capacity of swedge bolt. Use swedge bolt and nut to secure wire fabric.

520.10 Blast Cleaning of Repair Area. After performing 520.08 and 520.09, blast clean all surfaces to which shotcrete is to bond between 24 and 72 hours prior to placing of the shotcrete. All surfaces to which the concrete is to bond include exposed reinforcing steel, existing concrete, and the work face of any previously placed material. Blast clean all surfaces using high-pressure water blasting with or without abrasives in the water, abrasive blasting with containment, or vacuum abrasive blasting. High-pressure water washing requirements can be defined as a minimum pressure of 4000 psi (28 MPa) and flow of 5.0 gal/min (79 L/min). Maintain a standoff distance (the distance between the nozzle and the surface being cleaned) to a maximum of 12 in.

Bring the prepared substrate to saturated surface dry (SSD) with water meeting 520.02, ensure that all prepared substrate maintain a SSD prior to and during the shotcrete placement. The Engineer will approve the preparation and condition of all surfaces immediately before the application of the shotcrete.

520.11 Preconstruction Testing. Before placing any shotcrete on the project, each nozzleman will need to perform mock-up panels to be accepted by the Engineer. The purpose of the mock-up panel is to demonstrate the nozzleman's ability to place and finish shotcrete around the reinforcement. A nozzleman shall not perform any work on the structure until the Engineer accepts every mock-up panel.

Fabricate mock-up panels using the same personnel, equipment, materials and procedures that will be used on the project. Finish mock-up panels as required by plan, if no finish is required by plan, texture exposed surfaces according to 520.12.

Construct mock-up panels no less than 3 ft (0.9 m) square and a minimum of 4 inches (100 mm) deep. Mock-up panel depth will be adjusted if greater than 4 inches (100mm) to match the depth of application shown in the plans. Install reinforcement in the mock-up panel that matches the largest size and tightest spacing found for the reinforcement in the bridge. Orient the mock-up panel for a vertical surface application. If an overhead application is specified in the plan, perform an additional mock-up panel oriented for overhead application. Apply the shotcrete until panel is full and finish exposed surfaces. Age mock-up panels for at least 24 hours before cutting. Cut every mock-up panel in half, transverse to the main reinforcements. There shall be no voids with a maximum dimension greater than 0.25-inches adjacent to the reinforcement bars. If 0.25-inches or greater voids are found, an additional cut is to be performed to prove the debonding does not extend greater than 3-inches along the length of the reinforcement bar. The shotcrete in the mock-up panel shall not sag nor decrease the bond of the preceding coat for multiple layer application of shotcrete.

520.12 Shotcrete Placing. Place the shotcrete when the ambient temperature is between 50 °F and 90 °F. Do not place concrete against a surface containing frost, ice, standing water, or when the surface temperature is less than 40 °F. Protect the work from environmental conditions until final curing has been applied.

Do not place shotcrete during a rainfall event. Immediately cover previously placed shotcrete, not yet cured. Resume concrete placement after the rainfall stops.

Discontinue placement of shotcrete or shield the nozzle stream if wind causes separation of ingredients from the nozzle stream.

Apply the concrete using pneumatic equipment that sprays the mix onto the prepared surface. Minimize rebound and produce a compacted dense homogenous mass.

Use shooting strips or guide wires to ensure square corners, straight lines, and a plane surface of shotcrete, except as otherwise permitted by the plans or approved by the Engineer. Place shooting strips to keep the trapping of rebound at a minimum. At the end of each day's work, or similar stopping periods requiring construction joints, cut the work on a 45° angle through the full depth of the section, roughen the surface by stiff broom, racking or scoring for good surface bond when placing subsequent shotcrete layers. In shooting all surfaces, ensure that the stream of flowing material from the nozzle impinges as nearly as possible at right angles to the surface being covered, and hold the nozzle 2 to 4 feet (0.6 to 1.2 m) from the working surface.

Finish shotcrete repairs flush with the original masonry or concrete surface, except as noted for areas of exposed reinforcing steel. Do not initiate cutting or finishing until the shotcrete is sufficiently set. If not specified on plan, use rubber/sponge float to finish all exposed surfaces. On vertical and overhead surfaces, the layer thickness is to be establish and demonstrated during the preconstruction testing phase of the project. If a successive coat is applied on shotcrete that has set for more than 2 hours, clean and dampen the shotcrete surface as required in 520.05 for the prepared surface.

After shotcrete has been placed to the desired thickness, cut off all high spots with a sharp trowel, or screed them to a true plane as determined by shooting strips or by the original masonry surface, or as directed. If using screeds, apply them lightly to all surfaces so as not to disturb the shotcrete for an appreciable depth, and work them in an upward direction when applied on vertical surfaces.

Shotcrete rebounded outside of the formwork is prohibited from being worked back into the surface and is not to be salvaged and included in later batches. Rebounded shotcrete is the responsibly of the Contractor for removal and disposal.

520.13 Curing. Cover the pneumatically placed shotcrete patches with burlap or cotton mats and keep them wet for 7 days after placing. If it is not practical to use mats, keep the surface wet by sprinkling for the same length of time. If the Engineer determines that the above curing procedures are impractical because of the inaccessibility of isolated repair areas, the Contractor may cure the final shotcrete surface according to 511.14, Method B, using twice the manufacturer's recommended coating rate for formed concrete surfaces (equal to a white sheet of typing paper) at the time of application. Protect all shotcrete against cold weather according to 511.12.

Do not use curing compounds on any surfaces against which additional shotcrete or other cementitious finishing materials are to be bonded unless positive measures, such as prepare surface per 520.10, are taken to completely remove curing compounds prior to application of such additional materials.

520.14 Inspection and Testing. At a minimum provide one test panel per nozzleman at the beginning of each day shotcreting occurs. The purpose of the test panel is to determine the compressive strength of all shotcrete placed after test panel per Table 520.3B-1. Fabricate test panel using the same personnel, equipment, materials and procedures that will be used on the project.

Construct a 24 inch x 24 inch x 3.5 inch (610mm x 610mm x 89mm) test panel with no reinforcement. Cure test panel in the same manner used for the structure. Follow ASTM C 1140 for panel size and coring, and compressive strength testing as per ASTM C 1604. Provide a minimum of six cores, test three cores per test age. Test the cores at an AASHTO Accredited laboratory for compressive strength**.**

After curing and before final acceptance, sound all patched areas. Remove and replace all unsound or cracked areas. In addition to sounding all patches, the Department will base acceptance of the shotcrete on compressive strength tests on cores taken from test panels.

Remove, replace, re-inspect, and re-test all defective patches, as determined by sounding, visible cracks, or unacceptable cores. Fill core holes according to 519.

Maintain the in-place inspection access equipment employed during the original work activities or provide alternate inspection equipment such as platform lifts, bucket trucks, snooper trucks, or equivalent as approved by the Engineer for testing.

520.15 Method of Measurement. The Department will measure Pneumatically Placed Shotcrete by the number of square feet (square meters). The Department will measure the area of exposed surfaces of all completed, tested, and approved patches, irrespective of depth or thickness of the patch. If a patch includes corners or edges of such members as beams, columns, or curbs, the Department will include all the exposed surfaces; if a patch extends completely through a member or a slab, the Department will include both exposed surfaces.

The Contractor is responsible for all test panels, coring repair of core holes, independent laboratory testing of the cores, replacement of rejected areas, and all previously mentioned work under Pneumatically Placed Shotcrete for payment.

520.16 Basis of Payment. The Department will not pay for additional reinforcement to replace that damaged by the Contractor's operations.

The Department will not pay for removing, replacing, and re-inspecting of defective patched shotcrete as determined by sounding, visible cracks, or unacceptable cores.

The Department will pay for accepted quantities at the contract price as follows:

TABLE 520.16-1 SHOTCRETE 28 DAY COMPRESSIVE STRENGTH PAY FACTOR

Compressive Strength (psi)	Pay Factor (%)
>4000	100
3999 –3700	90
3699 – 3520	75
<3520	Remove and Replace

Item	Unit	Description
520	Square Foot (Square Meter)	Pneumatically Placed Concrete Shotcrete

523.02

On page 451, **Replace** the first and second paragraphs with the following:

523.02 General. Perform dynamic tests on ~~a minimum of~~ two successfully tested piles. A successfully tested pile is one that provides adequate data to provide pile driving criteria as described in 523.04. Test the first two piles driven for each pile size and UBV combination defined in the Plans; the two piles tested should be the two piles furthest apart within the same substructure unit and phase. Perform signal matching analysis of the dynamic test data on at least one of the two test piles. Perform the test according to ASTM D 4945 to determine driving requirements to achieve the required ultimate bearing values for the piles to be installed in the structure.

Perform restrike tests after piles have been driven and a minimum time specified in the plans has elapsed. When performing a restrike, warm the hammer before restriking the pile by applying at least 20 blows to another pile. Each restrike consists of performing dynamic testing on two piles and performing a signal matching analysis on one of the two piles tested. Test the same two piles as were tested for the dynamic load test item.

601.02

On page 464, **Replace** the first paragraph of the page with the following:

Ensure tied concrete block mats and articulating concrete block revetment systems are held together by galvanized steel wire, HDPE mesh, polypropylene mesh, or stainless steel wire.

601.12

On page 467, **Replace** the section with the following:

601.12 Tied Concrete Block Mat. When specified, use Tied Concrete Block Mat with Type ___ Underlayment conforming to 712.12 as shown on the plans. ~~Place directly on the Geotextile Fabric.~~ Install per the manufacturer's recommendation.

~~**601.15**~~

~~On page 468, **Replace** the Dumped Rock Fill, Type__ pay item description with the following: Tied Concrete Block Mat with Type__ Underlayment~~

601.15

On page 468, **Replace** the Tied Concrete Block Mat, Type__ pay item description with the following: Tied Concrete Block Mat with Type__ Underlayment

602.03.E

On page 470, **Replace** the next to last sentence of the first paragraph with the following sentence: Only provide prefabricated wingwalls and headwalls as alternatives that have been approved by the Office of Geotechnical Engineering, included on the Department's Approved List, and when allowed by the Contract Documents.

605.01

On page 475, **Replace** the entire first paragraph with the following:

605.01 Description. This work consists of ~~constructing~~ excavating, installing, and backfilling unclassified pipe underdrains, shallow pipe underdrains, deep pipe underdrains, base pipe underdrains, or rock cut underdrains with or without a Geotextile Fabric, construction underdrains, prefabricated edge underdrains and aggregate drains.

605.02

On page 476, **Replace** the first paragraph of 605.02 with the following:

Backfill unclassified pipe underdrains, shallow pipe underdrains, deep pipe underdrains, base pipe underdrains, ~~or~~ rock cut underdrains, with or without a Geotextile Fabric, construction underdrains and aggregate drains with granular material consisting of ACBFS, limestone, or gravel. Furnish granular material meeting Size Nos. 8, 9, or 89. Gradations may be modified in accordance with Supplement 1069.11.C. Use granular material with a maximum sodium sulfate soundness loss of 15 percent.

605.07

On page 478, **Replace** the entire section with the following:

605.07 Aggregate Drains. Construct the aggregate drains after the completion of granular pavement courses.

A. Spacing. Space aggregate drains at 50 foot (15 m) intervals on each side of normal crowned sections, staggered so that each drain is 25 feet (7.5 m) from the adjacent drain on the opposite side, and at 25 foot (7.5 m) intervals on the low side only of superelevated sections. For rigid pavements, adjust the spacing to match the end of a transverse joint. Construct an aggregate drain on both sides of the low point of each sag vertical curve or the low side only in superelevated sections.

B. Excavation. Excavate trenches for aggregate drains to a minimum width of 12 inches (0.3 m) and to the depth shown on the plans. Slope the bottom of the trench to drain and keep it free from loose particles of soil. Excavate the trench to furnish a clean exposure of the granular pavement courses.

C. Placing and Backfilling. Use granular material for the drains. Place the aggregate to a minimum depth of 8 inches (200 mm) above the bottom of the trench. The remaining depth of the trench backfill with suitable embankment material according to Item 203.

606.02

On page 480, **Replace** the third paragraph with the following:

When using round wooden posts, construct type MGS using posts 69 in (1.75 m) in length.

606.06

On page 481, **Add** the following paragraph after the fourth paragraph:

Cover the face of the impact head with solid fluorescent yellow Type G reflective sheeting conforming to 730.19.

608.03.E.

On Page 486, **Delete** the last two sentences of paragraph E.

~~After the minimum curing period and a 30 day drying time apply an approved non-epoxy sealer (705.23.B) according to Item 512. Ensure any remaining curing compounds that are incompatible with the selected sealer and all foreign materials are removed prior to sealer treatment.~~

609.06.E.

On Page 491, **Delete** the last two sentences of paragraph E.

~~After the minimum curing period and a 30 day drying time apply an approved non-epoxy sealer (705.23.B) according to Item 512. Ensure any remaining curing compounds that are incompatible with the selected sealer and all foreign materials are removed prior to sealer treatment.~~

610

Starting on page 492, **Delete** the entire section.

611.02

On page 496, **Replace** the entire first paragraph with the following:

611.02 Materials. Furnish conduit material of the specified conduit type and conduit size or one size larger with the approval of the Engineer. Conduit shown in the plans is designed for hydraulic capacity and the Material Durability Design. Provide conduit materials with Bedding and Structural Backfill materials that meet the structural design requirements of Supplement 1086 for each conduit run. Provide drainage structure materials with Bedding and Structural Backfill materials that will perform structurally for each location. Provide material descriptions and installation procedure details in the Installation Plans. Different conduit and drainage structure materials and the associated Bedding and Backfill may require varying installation procedures. If the conduit material is not specified in the plans, all material for that type of conduit will meet the Material Durability Design.

611.02.A.

On page 496, **Delete** the following material under section A. Type A Conduit – Culverts:

~~Vitrified clay pipe (extra strength only)……706.08~~

611.02.A.

On page 497, Under section A. Type A Conduit – Culverts, Replace the material name "Polypropylene Corrugated Double Wall Pipe……707.65" with the following:

Corrugated Polypropylene Smooth Lined Pipe……..707.65

611.02.A.

On page 497, **Delete** the following material under section A. Type A Conduit – Culverts:

~~Polypropylene Corrugated Triple Wall Pipe……..707.69~~

611.02.B

On page 497, **Delete** the following:

~~Corrugated steel spiral rib pipe……707.12~~

611.02.B

On page 497, **Add** the following after the fifth item on the list:

Polymer-precoated corrugated steel spiral rib pipe……707.11

611.02.B.

On page 497, Under section B. Type B Conduit – Storm or sanitary sewers under pavement,

Replace the material name "Polypropylene Corrugated Double Wall Pipe……707.65" with the following:

Corrugated Polypropylene Smooth Lined Pipe……..707.65

611.02.B.

On page 497, **Delete** the following material

~~Polypropylene Corrugated Triple Wall Pipe……..707.69~~

611.02.C

On page 498, **Delete** the following:

~~Corrugated steel spiral rib pipe……707.12~~

611.02.C

On page 498, **Add** the following after the fifth item on the list:

Polymer-precoated corrugated steel spiral rib pipe……707.11

611.02.C.

On page 498, **Replace** the material name "Vitrified clay pipe……706.08" with the following:

Vitrified clay pipe (extra strength only)……..706.08

611.02.C.

On page 498, **Replace** the material name "Polypropylene Corrugated Double Wall Pipe……707.65" with the following:

Corrugated Polypropylene Smooth Lined Pipe……..707.65

611.02.C.

On page 498, **Delete** the following material:

~~Polypropylene Corrugated Triple Wall Pipe……..707.69~~

611.02.D.

On page 498, **Delete** the following material:

~~Vitrified clay pipe (extra strength only)……..706.08~~

611.02.E.

On page 499, **Replace** the material name "Vitrified clay pipe……706.08" with the following:

Vitrified clay pipe (extra strength only)……..706.08

611.03

On page 501, **Add** the following to the seventh paragraph between the "707.07" and "707.12" material references:

, 707.11

611.03

On page 501, **Delete** the following definition:

~~**Design Service Life.** The average usable life of a conduit or structure.~~

611.03

On page 502, **Add** the following definition, after the definition "Lay Length":

Material Durability Design. Empirical design method used to ensure a 75-year average service life due to conduit material degradation caused by water chemistry and suspended material abrasion.

611.04.A.

On page 502, **Replace** the first sentence of the first paragraph with the following:

A. Shop Drawings. Prepare shop drawings and calculations for C&MS items 706.051, 706.052, 706.053, and "Special Design" 706.02 and as required below.

611.04.A.

On pages 502, **Replace** the entire section with the following:

A. Shop Drawings. Prepare and submit shop drawings for C&MS items 706.051, 706.052, 706.053. Submit calculations for C&MS items 706.051, 706.052, 706.053 and all conduit materials as required below. Have competent individuals prepare and check the shop drawings and required calculations. Provide a cover sheet containing the preparer(s) and checker(s): First Name, Last Name, Initials and Content Responsibility. Preparer(s) and checker(s) shall initial each sheet for their content responsibility. The preparer(s) and checker(s) shall not be the same individual. Have an Ohio Registered Engineer review, approve, sign, seal and date the shop drawing cover sheet or submittal letter and hydraulic calculations according to ORC 4733 and OAC 4733-35.

1. Submit load rating report in accordance to the most current version of ODOT's Bridge Design Manual along with one copy of the shop drawings and one copy of the calculations to the Office of Structural Engineering for all structures with a 10 foot or larger span. Submit an additional copy of the shop drawings and calculations to the Engineer.

2. If Reinforced Concrete Circular Pipe 706.02, requires a special structural design with a specified D-load requirement other than Tables 706.02-1 through 706.02-4, submit special structural design calculations. Design the pipe to meet the D-load requirements. Include the following information in the submittal: all structural design and loading information, all material specifications, all dimensions, and the installation plan.

3. Submittals for Precast reinforced concrete 3-sided flat topped culverts, precast reinforced concrete arch sections, or precast reinforced concrete round sections, (706.051, 706.052, or 706.053) shall include structural analysis methods, structural design criteria and calculations, structure details, and shop drawings. Include details for a precast slab bottom if required.

4. To substitute a precast reinforced concrete 3-sided flat topped culvert (706.051), a reinforced concrete arch section (706.052), or a precast reinforced concrete round section (706.053) for one another, the submittal shall include hydraulic calculations. The proposed culvert shall meet or exceed the same hydraulic requirements as the specified culvert and minimum cover requirements. If the specified culvert is on pedestal walls, include the shop drawings for the pedestal wall design in the submittal because 3-sided flat topped culverts, arch culverts, and round sections require different pedestal wall designs.

5. To substitute either a precast reinforced concrete 3-sided flat topped culvert, a precast reinforced concrete arch section, or a precast reinforced concrete round section (706.051, 706.052, or 706.053) placed on a precast or cast-in-place slab bottom for a precast reinforced concrete box culvert (706.05), the submittal shall include hydraulic calculations. The proposed culvert shall meet or exceed the same hydraulic requirements as the specified box culvert and minimum cover requirements. The Department may allow the bottom slab to be cast-in-place but will not issue a time extension for any delays resulting from the use of a cast-in-place bottom slab.

Department approval of shop drawings and calculations is not required.

611.04.B.

On pages 503, **Replace** the entire section with the following:

B. Installation Plan. Submit a written installation plan to the Engineer for installing all conduit and drainage structures for review and acceptance.

Submit the installation plan at least 15 days before any conduit or drainage structure work begins.

Do not perform work without an accepted installation plan.

Include the following required information for each conduit run:

1. Completed CA-P-1A Conduit Installation Plan Form dated 07-16-21.

2. Trench and excavation cross-sections with dimensions.

3. Bedding and Backfill material types with compaction density or compacted depth.

4. Plan and allowed buried height of cover.

5. Other installation details as necessary.

6. Provide written confirmation from the conduit manufacturer that the conduit material with the Bedding and Backfill types and compaction as described in the CA-P-1A Installation Plan Form will perform structurally for the location. This confirmation by the conduit manufacturer will not relieve the Contractor of the responsibility for obtaining the required results.

Include the following required information for each drainage structure:

1. Completed CA-P-3A Drainage Structure Installation Plan Form dated 07-16-21.

2. Trench and excavation cross-sections with dimensions.

3. Bedding and Backfill material types with compaction density or compacted depth.

4. Other installation details as necessary.

Submit any deviations from the installation plan prior to commencing with the Work. Resubmit all installation plan revisions and applicable special structural design calculations to the Engineer within 14 days of the change with the conduit manufacturer's written confirmation as described above. Do not perform conduit or drainage structure Work without an updated, manufacturer signed and accepted installation plan.

For structural plate and metal pipe arch conduit with a span of 57 inches (1440 mm) or larger, ensure the manufacturer provides match-marked ends on the conduit. Include a layout drawing in the installation plan.

For metal conduit with two structural plate thicknesses specified, identify the location of the thicker plates. For precast concrete 3-sided flat and arch topped structures (706.051 and 706.052) provide a 3 inch (75 mm) deep keyway centered on the leg and at least 6 inches (150 mm) wider than the thickness of the leg at the bottom. For precast concrete round sections (706.053) provide an 8 inch (200 mm) deep keyway for spans up to 24 feet (7.3 m) and a 10 inch (254 mm) deep keyway for spans greater than 24 feet, (7.3 m). Center the keyway on the precast arch base. The width of the keyway must be 8 inches (200 mm) greater than the thickness of the precast arch base. For non-vertical leg arches set on pedestal walls, a one sided keyway is acceptable if the required pedestal wall design thickness is not sufficient for a full keyway.

611.04.C.

On pages 504, **Replace** the first sentence of the section with the following:

Perform work so that it can be verified by the Contractor's representative performing the inspection.

611.04.C.

On pages 504, **Add** the following sentence after the first sentence of the section:

Notify the Engineer in writing at least 14 days prior to beginning the work.

611.05

On page 505, **Replace** the third paragraph with the following:

Provide a firm bed for the full width and length of the trench for conduits and drainage structures. Remove any unsuitable material exposed in the bed for the width of the trench and a depth of at least 6 inches (150 mm). Replace the unsuitable material with structural backfill, Type 1 or 2. Remove any rock

or shale exposed in the bed to a depth of at least 6 inches (150 mm). Replace the rock or shale with Structural Backfill, Type 1 or 2. The Department will pay for this work according to 109.05, unless otherwise noted in the Contract Documents. If the Engineer changes the flow line by more than one foot (0.3 m), the Department will pay according to 109.05, unless otherwise noted in the Contract Documents.

611.06

On page 506, **Replace** the third paragraph with the following:

Vibrate, tamp or compact each Bedding and Backfill lift. Perform compaction density testing of Bedding and Backfill according to Supplement 1015. If Structural Backfill Type 3 or open graded material is used, place the aggregate in lifts not to exceed 12-inches. Measure the Structural Backfill Type 3 compacted lift to ensure consolidation is 85 percent or more of the original lift thickness.

Final Backfill shall meet or exceed the requirements of 203.

611.08A.3.

On page 508, **Replace** the misspelled word "coorugated" with the following:

corrugated

611.11

On page 512, **Add** the following sentence to the beginning of the fourth paragraph of the section:

For all aluminum conduits, prior to placing concrete, coat the area to be paved with a zinc chromate primer or an epoxy paint formulated for applying to aluminum. Extend primer or epoxy 4 inches beyond the proposed paving limits.

611.11

On page 512, **Replace** the first sentence of the fifth paragraph with the following:

Construct paving so that it is 3 inches (75 mm) thick measured from the top of the corrugations of the conduit to a height equal to 1/3 of the Conduit Rise.

611.12 Performance Inspection

On page 515, **Add** the following to TABLE 611.12.B:

TABLE 611.12.B

Conduit Type	Measurement Equipment	Type of Measurement
Rigid conduit and 748.06, steel casing pipe	Crawler mounted camera according to SS902.01with crack measuring capabilities according to SS902.02 C	Joint gaps Crack widths
Plastic conduit, 707.12, corrugated steel spiral rib conduit, 707.24, corrugated aluminum spiral rib conduit, 748.01, ductile iron pipe, and Circular corrugated metal conduit not listed below	Crawler mounted camera with laser profiler according to SS902.02 A, B, and C or Mandrel according to SS902.03 and Crawler mounted camera according to SS902.01 with crack measuring capabilities according to SS902.02 C	Joint gaps Crack widths Deflection
The following types of corrugated metal conduit: 707.04, precoated, galvanized steel culverts 707.05 and 707.07, bituminous coated corrugated steel pipe with paved invert, 707.11 Polymer-precoated corrugated steel spiral rib pipe 707.13 and 707.14, bituminous lined corrugated steel pipe	Crawler mounted camera with laser profiler according to SS902.02 A, B, and C	Joint gaps Crack widths Deflection

611.13

On page 515, **Replace** the first paragraph with the following:

611.13 Conduit Evaluation. Have an independent Registered Engineer review the conduit Performance Inspection and provide a written documentation of whether defects listed in Table 611.13 are present or not. Record any other identified defects present in the conduit. Evaluate ~~all identified~~ the defects to ensure structural stability and hydraulic capacity are in conformance with the contract documents and as prescribed by AASHTO LRFD Bridge Construction Specifications, Section 26 for metal conduit, Section 27 for concrete conduit, and Section 30 for plastic conduit with modifications according to this specification. Provide written documentation of evaluations performed of all defects and any recommended repairs to the Engineer. The independent Registered Engineer cannot be an employee of the Contractor or the conduit manufacturer.

611.14

On page 517, **Replace** the entire first paragraph with the following:

611.14 Drainage Structure Evaluation. Have an independent Registered Engineer ~~review~~ evaluate the drainage structures and provide a written documentation of whether defects listed in Table 611.14 are present or not. Record any other identified defects present in the drainage structure. Evaluate all identified defects to ensure structural stability and hydraulic capacity are in conformance with the contract documents. Provide written documentation of evaluations performed of all defects and any recommended repairs to the Engineer. The independent Registered Engineer cannot be an employee of the Contractor or drainage structure manufacturer.

611.14

On page 517, **Add** the following rows to the end of Table 611.14:

Conduit connections are not fully grouted per 611.10
Conduits protrusions are present

614.03

On page 523, **Add** the following title to the beginning of the second paragraph:

A. Training and Responsible Person.

614.03

On Page 524, **Add** the following title to the beginning of the second paragraph:

B. Temporary Traffic Control Devices.

614.03

On Page 524, **Add** the following paragraph after the third paragraph:

For truck-mounted attenuators and trailer attenuators (TMAs) see 614.03.D.

614.03

On page 524, **Replace** the first sentence of the seventh full paragraph with the following:

Furnish traffic cones consisting of a highly visible orange predominant color with reboundable reflective sheeting complying with the requirements of 730.191 and in conformance with the OMUTCD.

614.03

On Page 525, **Add** the following paragraph after the first paragraph:

All temporary traffic control devices shall conform to the Quality Standards for Temporary Traffic Control Devices and Acceptable Delineation Methods for Vehicles.

614.03

On Page 525, **Add** the following title to the beginning of the second paragraph:

C. Conspicuity.

614.03

On Page 525, in the 7th paragraph **Replace** the following: "**A.** Apply one" with "1. Apply one".

614.03

On Page 525, in the 8th paragraph **Replace** the following: "**B.** Outline" with "2. Outline".

614.03

On Page 525, in the 9th paragraph **Replace** the following: "**C.** Outline" with "3. Outline".

614.03.C

On Page 526, **Replace** the second paragraph with the following:

Acceptable methods for delineating material supply vehicles are depicted in the Quality Standards for Temporary Traffic Control Devices and Acceptable Delineation Methods for Vehicles.

614.03

On Page 526, **Add** the following at the end of the subsection:

D. Truck-mounted or Trailer Attenuator (TMA). Furnish a TMA that is NCHRP-350 (manufactured prior to 1/1/20) or MASH TL-3 compliant. Do not use a TMA in place of the arrow board at the beginning of a merge taper, or as a substitute in locations where other positive protection methods are required (portable barrier/impact attenuators, tapering outside of the clear zone, etc.). Use of a TMA for a work area already otherwise protected by positive protection shall be at the Contractor's expense.

Furnish a TMA to protect each work area in the following situations:

1. When working on a multi-lane highway (45 mph and above) in a closed lane or shoulder without portable or permanent traffic barriers separating the work area from the traveled lanes.
2. Any situation on a multi-lane highway (45 mph and above) where a TMA is depicted or labeled as required or optional on a shadow vehicle in the OMUTCD.

Furnish a TMA for each work area if two or more localized work areas occur within the same stationary work zone and are separated by more than 700 feet.

Attach the TMA to the shadow vehicle in accordance with manufacturer specifications and place in advance of the work area according to recommended spacing in Table 614.03-1. Distances are considered as guidelines. However, engineering judgement should be used to alter distances to take into account traffic conditions, vehicle mix, sight distance, and other site-specific conditions.

Table 614.03-1

For Shadow Vehicles Weighing 22,000 lb. or More		
Speed Limit (MPH)	**Recommended Spacing [1]**	
	Stationary Operation (Ft)	**Moving Operation (Ft) [2]**
Greater than 55	150	172
45-55	100	150
Less than 45	74	100
For Shadow Vehicles Weighing Less than 22,000 lb. but Greater Than 9,900 lb.		
Speed Limit (MPH)	**Stationary Operation (Ft)**	**Moving Operation (Ft) [2]**
Greater than 55	172	222
45-55	123	172
Less than 45	100	100

[1] Recommended spacing is distance between front of shadow vehicle and beginning of work area to provide adequate roll ahead distance and minimize the risk of vehicles cutting in ahead of the shadow vehicle.

[2] Distances are appropriate for speeds up to 15.5 mph.

614.03.C.

On page 525, **Replace** the entire section with the following:

C. Conspicuity. Equip all vehicles with photo strobe lights, LED warning lights, or rotating beacons meeting Class 1 specifications for color and intensity as defined by the Society of Automotive Engineers (SAE).

Photo strobe lights, LED warning lights, or rotating beacons shall be horizontally visible from all directions (360 degrees) at a distance of 100 feet minimum. In order to ensure this visibility, the light shall in no way be obstructed from view by any signs or appurtenances on the vehicle.

Activate the photo strobe lights, LED warning lights, or rotating beacons and all hazard lights anytime the vehicle is entering, exiting or operating in a traveled lane at a speed less than the posted speed within the limits of the work zone or one mile of either end of the work zone.

In addition, equip all vehicles and trailers having a gross vehicle weight rating of 10,000 pounds or greater, in single or combination, with conspicuity tape. Also, delineate all NCHRP 350 Category IV equipment (arrow boards, portable changeable message signs, etc.) with conspicuity tape.

Conspicuity Tape: Use red and white, Type G, H, or J retroreflective sheeting that complies with 730.19, 730.192, and 730.193.

1. Apply one 2 inch wide (minimum) horizontal stripe of Type G, H, or J retroreflective sheeting to a minimum of 50 percent of the length of each side of the payload portion of the vehicle, rearward from the back of the cab, NCHRP 350 Category IV equipment and trailers. Space lengths of tape evenly over the length of the payload portion of the vehicle rearward from the back of the cab, NCHRP 350 Category IV equipment, and trailers. The centerline for each strip of retroreflective sheeting shall be between 15 inches and 60 inches above the road surface when measured with the vehicle empty or unladen, or as close as practicable to this area.

2. Outline the lower rear facing area of the vehicle, NCHRP 350 Category IV equipment, and trailers with 2 inch wide (minimum) horizontal stripe of Type G, H, or J retroreflective sheeting. Apply the lower horizontal markings extending the width of the vehicle, NCHRP 350 Category IV equipment, and trailer as close as practical to the edge of the vehicle, NCHRP 350 Category IV equipment, and trailer. The centerline for each strip of lower horizontal retroreflective sheeting shall be between 15 inches and 72 inches above the road surface when measured with the vehicle empty or unladen, or as close as practicable to this area.

3. Outline the upper rear facing area with two pairs of strips of 2-inch wide (minimum) retroreflective Type G, H, or J sheeting, each pair consisting of strips 12 inches long, must be positioned horizontally and vertically on the right and left upper corners of the rear of the body of each vehicle or trailer, as close as practicable to the top of the vehicle or trailer and as far apart as practicable. If the perimeter of the body, as viewed from the rear, is not square or rectangular, the strips may be applied along the perimeter, as close as practicable to the uppermost and outermost areas of the rear of the vehicle or trailer on the left and right sides.

Escort transport or delivery vehicles without proper photo strobe lights, LED warning lights, or rotating beacons or conspicuity tape to and from the work zone only with the approval of the Engineer. This exception is intended for limited use at the discretion of the Engineer and will only be considered following a written request by the Contractor. Otherwise, equip all vehicles with photo strobe lights, LED warning lights, or rotating beacons and conspicuity tape as described herein.

Acceptable methods for delineating material supply vehicles are depicted in the Quality Standards for Temporary Traffic Control Devices and Acceptable Delineation Methods for Vehicles.

614.10

On page 529, **Add** the following sentences to the end of the second paragraph:

Covering of one or more permanent or temporary vehicle or pedestrian signal head(s) shall be according to 632.25, except payment shall be included in Item 614 Maintaining Traffic.

Energized signal covers shall block light from being visible.

614.11.B.

On page 529, **Replace** the entire section with the following:

B. Work Zone Marking Specifications. Equip traffic paint striping equipment for Class I and Class III markings with a computerized Data Logging System (DLS) conforming to 641.04 ~~when the length of marking exceeds 0.5 miles (0.8 km) of continuous line equivalent.~~ Furnish the Engineer daily, biweekly, and final DLS reports according to 641.04.

Unless otherwise shown on the plans, the Contractor may use 740.02 Type 1 or Type 1A paint, Supplemental Specification 807 Traffic Paint, Supplemental Specification 873 Wet Reflective Removable Tape, 740.10, or 740.06 Type I or Type II preformed material for work zone pavement markings. Do not use wet reflective optics specified in Supplemental Specification 807 with 740.02 Type 1A paint for cold weather applications. Unless using Supplemental Specification 807 Traffic Paint, furnish painted markings according to Item 642 except that:

1. For Class I or Class II work zone pavement markings, use the specified application rate from Table 614.11-1.

TABLE 614.11-1

	Line Width (inch)				
	4	6	8	12	24
Type of Pavement Marking	**Gallon per Mile of Line**				
Solid Line	22	33	44	66	132
10-foot Dashed Line	5.5	8.25	--	--	--
4-foot Dashed Line	2.2	3.3	--	--	--
Dotted Line	7.3	10.95	14.6	21.9	--
Arrows, Symbols, and Words	1.4 gallons per 100 square feet				
Glass Beads: 740.09, Type A	15 pounds per 100 square feet				

TABLE 614.11-1M

	Line Width (mm)				
	100	150	200	300	600
Type of Pavement Marking	**Liter per Kilometer of Line**				
Solid Line	52	78	105	157	314
3.0 m Dashed Line	13	19.5	--	--	--
1.2 m Dashed Line	5.2	7.8	--	--	--
Dotted Line	17.3	25.95	34.6	51.9	--
Arrows, Symbols, and Words	0.6 liters per square meter				
Glass Beads: 740.09, Type A	7.3 kg per square meter				

2. For Class III work zone markings, use the specified application rate from Table 614.11-2.

TABLE 614.11-2

	Line Width (inch)				
	4	6	8	12	24
Type of Pavement Marking	**Gallon per Mile of Line**				
Solid Line	12	18	24	36	72
10-foot Dashed Line	3	4.5	--	--	--
Dotted Line	4	6	8	12	--
Arrows, Symbols, and Words	0.75 gallons per 100 square feet				
Glass Beads: 740.09, Type A	7.5 pounds per 100 square feet				

TABLE 614.11-2M

	Line Width (mm)				
	100	150	200	300	600
Type of Pavement Marking	**Liter per Kilometer of Line**				
Solid Line	28	42	56	84	168
3.0 m Dashed Line	7	10.5	--	--	--
Dotted Line	9.4	14.1	18.8	28.2	--
Arrows, Symbols, and Words	0.3 liters per square meter				
Glass Beads: 740.09, Type A	3.7 kg per square meter				

Ensure that Type I and II preformed material conform to 740.06 or wet reflective preformed material conforms to Supplemental Specification 873, except do not place any preformed material containing metal on any surface unless it will be removed later. Remove work zone pavement markings of 740.06 or Supplemental Specification 873 preformed material before placement of 642 or 644 surface course markings at that location. Ensure that preformed material conforms to Item 645 or Supplemental Specification 873.

614.11.G.1.a

On page 532, **Delete** the third paragraph:

~~Use only sand, shot, or water blasting for removal of all pavement markings in preparation for placing Item 422 Chip Seal or Item 421 Microsurfacing.~~

614.16.B

On page 539, **Add** the following language as a new line at the end of the subsection:

6. TMAs.

614.16.C

On page 539, **Replace** the subsection with the following:

C. If traffic permanently damages beyond use any of the work zone traffic control items listed in 107.15, the Department will compensate the Contractor for replacement of the damaged item by Change Order provided the Contractor has pursued but failed to obtain compensation from the motorist.

614.16

On page 540, **Add** the following paragraph after the first paragraph:

C&MS Table 104.02-2 does not apply to final quantities of Law Enforcement Officer with Patrol Car.

614.16

On page 540, **Revise** the section as follows:

Item	Unit	Description
614	Lump Sum	Maintaining Traffic
614	Lump Sum	Detour Signing
614	Each	Replacement Drum
614	Each	Replacement Sign
614	Each	Object Marker, ___ - Way
614	Each, Mile, Foot (Kilometer, Meter)	Work Zone Pavement Markings
614	Each	Work Zone Raised Pavement Marker
614	Sign Month	Portable Changeable Message Sign
614	Each	Work Zone Speed Limit Sign
614	Each	Work Zone Marking Sign
614	Hour	Law Enforcement Officer with Patrol Car
614	Each	Barrier Reflector
614	Each	Work Zone Crossover Lighting System
614	Each	Work Zone Impact Attenuator, ____*** Wide Hazards, ____****
614	Mile (Kilometer)	Work Zone Lane Line, Class ___, ___*, ___**
614	Mile (Kilometer)	Work Zone Center Line, Class ___, ___**
614	Foot (Meter)	Work Zone Channelizing Line, Class ____, ___*, ___**
614	Mile (Kilometer)	Work Zone Edgeline, Class ____, ___*, ___**
614	Foot (Meter)	Work Zone Gore Marking, Class II, ___**
614	Foot (Meter)	Work Zone Stop Line, Class I, ___**
614	Foot (Meter)	Work Zone Arrow, Class I, ___**
614	Foot (Meter)	Work Zone Crosswalk Line, Class I, ___**
614	Foot (Meter)	Work Zone Dotted Line, Class ___, ___*, ___**
614	Cubic Yard (Cubic Meter)	Asphalt Concrete for Maintaining Traffic

* Width of marking (4” or 6” for Lane Lines, Edgelines and Dotted Lines; 8” or 12” for Channelizing Lines and Dotted Lines).

** Type material (807 paint; 642 paint; 740.06, Type I or Type II; 873; 648; or left blank to allow any of the six.)

*** Width (24 in or over 24 in and less than 36 in).

**** Configuration (Unidirectional or Bidirectional).

617.03

On page 544, **Replace** the first paragraph of 617.03 with the following:

617.03 Prosecution. If reconditioning shoulders as part of a resurfacing project and traffic is maintained, place shoulder material along with the paving operations as rapidly as possible. Complete all shoulder reconditioning within four days following placement of the surface course and any course that results in a drop-off of 2.0 inches (50 mm) or greater. Adjacent to a safety edge constructed as part of the Work, complete all shoulder reconditioning within ten days following construction of the safety edge.

618

On Page 546 **Replace** the entire specification with the following:

ITEM 618 RUMBLE STRIPS

618.01 Description
618.02 Construction
618.03 Method of Measurement
618.04 Basis of Payment

618.01 Description. This work consists of grinding depressions longitudinally in paved shoulders (rumble strips), at locations shared by edge lines or center lines (rumble stripes), or cutting grooves transversely across lanes (transverse rumble strips).

Construct longitudinal rumble strips according to the standard construction drawings BP-9.1 (Shoulder Rumble Strips) or TC-64.10 (Rumble Stripes), and transverse rumble strips according to standard construction drawing BP-9.2 (Transverse Rumble Strips).

618.02 Construction.

A. General. Equip the cutting tool with guides or a guidance system, clearly visible to the operator, to provide for consistent alignment. Take effective measures to control dust during the grinding operation. Remove and dispose of all grinding materials deposited on the roadway pavement in a manner approved by the Engineer and before opening the roadway to traffic.

B. Longitudinal Rumble Strips. Furnish equipment with a rotary cutting head that will grind the depressions to the required dimensions. Equip the cutting head with a pattern of cutting tips to produce a smooth cut with approximately 0.06 inches (1.5 mm) between peaks and valleys. Ensure that the cutting head is on its own suspension system, independent from that of the power unit, to allow the head to align itself with the slope of the shoulder or any irregularities in the shoulder surface.

C. Transverse Rumble Strips. Use equipment to install Transverse Rumble Strips to the requirements of the plans and specifications without damaging surrounding pavement, pavement markings, or other project features.

618.03 Method of Measurement. The Department will measure longitudinal rumble strips by the number of feet (meters) or mile (kilometer) as the sum of the lengths of the individual segments. The Department will measure lengths along the inside edge of the shoulder, edge line or center line, from the center of the first depression in a segment to the center of the last depression in that segment. If longitudinal rumble strips are provided on more than location, the Department will measure lengths separately for each shoulder, center line or edge line segment and add the individual lengths together to obtain the total length for the shoulder, center line or edge line.

The Department will measure transverse rumble strips by the number of each for one pad consisting of fifteen parallel 4-inch grooves cut at 1-foot intervals.

618.04 Basis of Payment. The Department will not pay for repairing surface damage and extraneous marks caused by the Contractor's operations.

The Department will pay for longitudinal pavement marking material in accordance with Item 641.

The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
618	Feet (Meter)	Rumble Strips, Shoulder (Asphalt Concrete)
618	Mile (Kilometer)	Rumble Strips, Shoulder (Asphalt Concrete)
618	Feet (Meter)	Rumble Strips, Shoulder (Concrete)

618	Mile (Kilometer)	Rumble Strips, Shoulder (Concrete)
618	Feet (Meter)	Rumble Stripes, Edge line (Asphalt Concrete)
618	Mile (Kilometer)	Rumble Stripes, Edge line (Asphalt Concrete)
618	Feet (Meter)	Rumble Stripes, Edge line (Concrete)
618	Mile (Kilometer)	Rumble Stripes, Edge line (Concrete)
618	Feet (Meter)	Rumble Stripes, Center line (Asphalt Concrete)
618	Mile (Kilometer)	Rumble Stripes, Center line (Asphalt Concrete)
618	Feet (Meter)	Rumble Stripes, Center line (Concrete)
618	Mile (Kilometer)	Rumble Stripes, Center line (Concrete)
618	Each	Rumble Strips, Transverse (Asphalt Concrete)
618	Each	Rumble Strips, Transverse (Concrete)

619

On page 548, **Replace** Table 619.02-1 FIELD OFFICE with the following:

TABLE 619.02-1 FIELD OFFICE

Item	**Type A**	**Type B**	**Type C**
Minimum ceiling height, ft (m)	7 (2.1)	7 (2.1)	7 (2.1)
Floor space, ft² (m²)	150 (14)	500 (46)	1000 (93)
Separate enclosed room, ft² (m²) (Part of specified floor space)	0 (0)	0 (0)	100 (9)
Telephone service [1]	2	2	2
Internet service connection [5]	1	1	1
Multi-Function copier that is setup for scanning, printing and copying. [2]	1, 11×17	1, 11×17	1, 11×17
Calculator with tape	1	2	3
Desk and chair set	1	3	5
Work table, 30 × 72-inch (750 × 1800 mm)	1	2	3
4-drawer, legal size, lockable metal file cabinet	---	1	2
2-drawer, metal file cabinet	1	2	2
Portable fire extinguishers [3]	1	1	2
Plan rack [4]	1	1	2
All-weather parking spaces	8	16	20

[1] For each telephone and/or computer station specified, all ethernet wiring necessary to connect the phone and/or computer and multi-function copier to the internet company system~~, and a working separate phone number for the printer for faxing~~.

[2]Copier must meet minimum specifications provided for each field office type. Contractor responsible for paper supplies, copier supplies, and maintenance of copier.

Type A:

One of the following MFC machines/series:

HP models E77822dn, E77825dn, E77830dn, E87640dn, E87650dn, E87660dn, E77822z, E77825z, E77830z, E87640z, E87650z, E87660z

Type B and C:

One of the following MFC machines/series:

HP Models: E77650dn, E77660dn, E77650dns, E77660dns, E77650z, E77660z, E77650zs, E77660zs, E77660zts, E77650z+, E77660z+, E77822dn, E77825dn, E77830dn, E87640dn, E87650dn, E87660dn, E77822z, E77825z, E77830z, E87640z, E87650z, E87660z

[3]Type 2-A:10-B:C, 5-pound (2.27 g) size

[4]Capable of handling the breakdown of 22 × 34-inch (559 × 864 mm) sized plans into ten sections.

[5]Provide a broadband internet connection capable of minimum download speeds as follows:

30 Mbps download 5 Mbps upload - Network Latency less than 50 milliseconds. If speeds are not available through an individual or singular circuit, provide the highest speed available in the area and install multiple circuits to achieve the specified speeds. When multiple broadband services are available the following is the preferred order: Cable, DSL, Cellular, and Wireless Radio (Satellite Communication is not compatible with ODOT VPN connection and will not be accepted). If a cellular network is used, provide the cellular equipment, including software and router equipment to connect to the ODOT provided Cisco ASA 5505 firewall. Supply ODOT with all documentation for the broadband circuit including all username/user ids, passwords and account information. Verify that the broadband internet connection is active and working as specified. ODOT IT personnel will confirm that bandwidth and network latency are compliant with the required field office specifications. All field office Internet connections are for ODOT use only.

621.03.E

On page 552, **Delete** "or on line" in the first sentence of the second paragraph.

622.08

On page 556, **Replace** the first sentence of the fourth paragraph with the following:

The Department will measure Portable Barrier Anchored, Portable Barrier Unanchored, Portable Barrier 50" (1270mm) and Portable Barrier 50" (1270mm) Bridge Mounted by the number of feet (meters) for each application of the barrier placed according to the plans.

622.09

On page 556, **Replace** the second paragraph with the following:

The Department will pay for accepted quantities at the contract prices as follows:

Item	**Unit**	**Description**
622	Foot (Meter)	Concrete Barrier, Type ___
622	Each	Concrete Barrier End Anchorage, Reinforced, Type ___
622	Each	Concrete Barrier End Section, Type ____
~~622 Foot (Meter) Portable Barrier, ___" (___ mm)~~		
~~622 Foot (Meter) Portable Barrier, ___" (___ mm) Bridge Mounted~~		
622	Foot (Meter)	Portable Barrier, Unanchored
622	Foot (Meter)	Portable Barrier, Anchored
622	Foot (Meter)	Portable Barrier, 50" (1270 mm)
622	Foot (Meter)	Portable Barrier, 50" (1270 mm) Bridge Mounted

625

On page 562, Replace "625.20 Plastic Caution Tape" in the list with the following:

625.20 Underground Warning / Marking Tape

625.05

On page 563, **Replace** "Plastic caution tape" in the material list with the following:
Underground warning / marking tape……... 725.22

625.12

On page 566, **Replace** the third sentence of the first paragraph to the following:
Use of conduit material shall comply with the NEC.

625.12

On page 567, **Add** the following paragraph after the fourth paragraph:

Do not use PVC conduit when multiple cell conduits are installed encased in a concrete barrier wall and install continuous lengths of HDPE conduit between junction boxes in the concrete barrier wall or transitions to underground pull boxes.

625.15

On page 569, **Add** the following sentence at the end of the seventh paragraph:
This compensation is for invoiced cost without mark-up.

625.20

On page 572, **Replace** the section with the following:

625.20 Underground Warning / Marking Tape. Install tape approximately 6 to 10 inch (150 to 250 mm) below the final finished grade. Place with the printed side up and parallel with the finished surface. Ensure that the tape is not pulled, distorted, or otherwise misplaced in completing the trench backfill. Provide approximately 10 ft (3 m) of tape inside each adjacent pull box connecting the underground utility run. Bond the tracer wire to a good earth ground in each pull box.

625.22

On page 575, **Delete** the fourth sentence in the first paragraph.

~~Trench in paved areas shall be separated for payment into Type A for pavements or sidewalks less than 6 inches (150 mm) thick and Type B for pavements 6 inches (150 mm) or greater.~~

625.22

On page 575, **Replace** the first sentence in the 6th paragraph with the following:

Underground warning / marking tape will be measured to the center of a light pole foundation, the center of a light tower foundation, the center of a pull box, the center of the pole of an embedded pole mounted power service, the center of the foundation for a power service with a foundation, or the wall of the building when the power service for the lighting in, on or within the building with no allowance for elevation change.

625.23

On page 576, **Replace** the pay item for "Plastic Caution Tape" with the following:
625 Foot (Meter) Underground Warning / Marking Tape

Revise the "Trench in Paved Area, (Type)" pay item as follows
625 Foot (Meter) Trench in Paved Area

626.01

On page 577, **Revise** the first paragraph as follows.

626.01 Description. This work consists of furnishing and installing barrier reflectors on guardrail blockouts, concrete barrier, cable barrier, retaining wall, and bridge parapets.

626.02

On page 577, **Revise** the third paragraph as follows.

Use barrier reflectors that are mountable on guardrail blockouts, concrete barriers, cable barrier, retaining walls, and bridge parapets. For wall or parapet mount, the barrier reflector may not extend further than 5 inches (125 mm) in a horizontal direction towards the traffic lanes.

626.04

On page 578, **Add** the following paragraph after the third paragraph.

Install reflectors that attach to the cable barrier on the cable that is nearest to traffic. If more than one cable is nearest to traffic, attach to the highest cable nearest to traffic. Install them centered between posts.

626.04

On page 578, **Add** the following paragraph after the eight paragraph.

For all median cable barrier reflectors, use bi-directional reflectors.

626.04

On page 578, **Revise** the ninth paragraph as follows.

Use one-way and bi-directional guardrail blockout, concrete barrier, retaining wall, and bridge parapet barrier reflectors according to the following table:

626.04

On page 579, **Revise** the first table as follows.

Mounting Location	
Concrete barrier, retaining walls, bridge rail or bridge parapets	
Type 1	Barrier Reflector
Guardrail	
Type 2	Corrosion Resistant Metal Guardrail Blockout Reflector
Type 3	Acrylic or Polycarbonate Plastic Guardrail Blockout Reflector
Type 4	Spring Loaded Guardrail Blockout Reflector
Type 5	L-Type Guardrail Blockout Reflector
Cable Barrier	
Type 6	Cable Barrier Reflector

630.04

On page 581, **Replace** the fourth paragraph with the following:

For flat sheet, double faced mile marker, and double faced street name signs, use Type G, H or J reflective sheeting for background and reflective legends. For extrusheet signs, use Type G reflective sheeting for the background, and use Type J, ASTM D 4956 Type XI reflective sheeting for reflective legends, shields and symbols (including hazardous material plaque, airport symbol, arrows and borders). Apply reflective sheeting to the surface according to the manufacturer's recommendations, with no blisters, wrinkles, tears, or blemishes. Do not use reboundable or damage control sheeting for permanent signs.

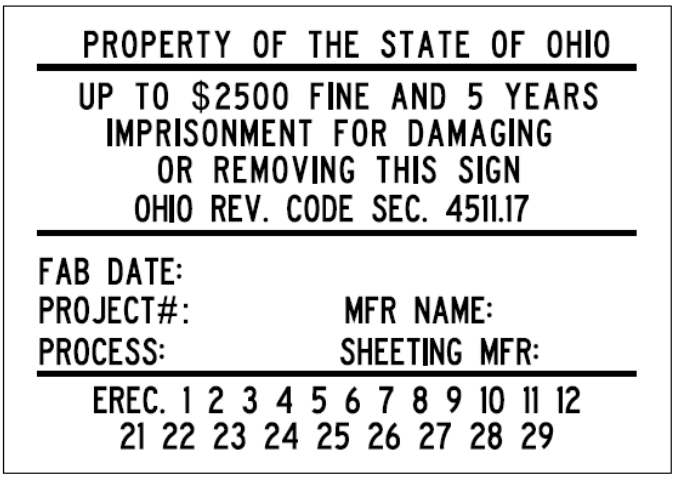
630.04

On page 582, **Replace** the sixth full paragraph and the sticker design and alternate sticker design under Figure 1 with the following:

Silk screen or digitally print the fabrication data onto the face of the sticker, and include the month and year of fabrication, state project number, sign manufacturer name, the sign process (silkscreen, digital, cut vinyl), and the sheeting manufacturer brand. At the time of sign erection, indicate the erection data by scratching out the appropriate month and year.

FIGURE 1

Sticker design:



630.04

On page 583, **Replace** the first sentence of the last paragraph with the following:

Fabricate sign post reflectors with flat sheet aluminum and match the reflective sheeting type to the sheeting type used for the corresponding sign.

630.06.B.

On page 585, **Replace** the first sentence of the fourth paragraph with the following:

When specified, furnish sign support identification stickers of Type F reflective sheeting listing the support type, design number, span/arm length, county, route, and section number (example: TC-15.116, design 1, 80 ft span, CUY-90-17.58).

630.06.B.

On page 585, **Delete** from the second sentence of the fifth paragraph the following:

Fabricate box trusses from ~~aluminum or~~ steel tubular members with built-in camber and mark each section “TOP”.

630.15

On page 590, **Replace** “Span Wire Sign Support TC-17.10, Design ____” pay item with the following.

630 Each Span Wire Sign Support, Type TC-17.11, Design ____

632

On page 596, **Revise** "632.09 Pedestrian Pushbutton" as follows.

632.09 Pedestrian Pushbutton and Accessible Pedestrian Pushbutton

632.03

On page 597, **Delete** "732.08" from Detectors in the material list.

Detectors ..... 732.07~~, 732.08~~

632.03

On page 597, **Replace** Tether Wire in the material list as shown below.

Tether Wire..... 732.18

632.05

On page 598, **Add** the following to Table 632.05-1:

TABLE 632.05-1 TABLE AND WIRE IDENTIFICATION

Cable	**Tag**
Ground	GND
Power (2 wire)1∅ 120 volt	AC +AC- or ACN
Power (3 wire) 1∅ 120/240 volt Neutral wire	AC + 1, AC + 2 AC- or ACN
Phase A Phase 1 Phase 1 northbound left turn lanes	∅ A ∅ 1 ∅ 1 NBLT
Phase A, pedestrian signal	∅ A PD
Radar, Advance Detection Phase, Direction	RAD-Adv ∅2, NB
Radar, Stop Line Detection Phase, Direction	RAD-SL ∅1, SBLT
Overlap, phase A + C Overlap, phase 1 + 6	∅ A + C ∅ 1 + 6
Detector lead-in, phase A Detector lead-in, phase 1 Detector lead-in, phase 1 northbound left turn lanes	DET A DET 1 DET 1 NBLT
Detector lead-in, phase A (call type) Detector lead-in, phase 1 (call type) northbound thru lanes	DET A CALL DET 1 CALL NB-THRU
Detector harness[1]	DET A
Interconnect	IC
Pre-emption, fire	PE FIRE
Pre-emption, railroad	PE RR
[1]Place the tag next to the MS plug at the detector amplifier.	

632.06

On page 599, **Replace** the second paragraph with the following:

Install signals in a plumb condition, using a balance adjuster only if approved by the engineer. Rigidly mount heads to mast arms with the yellow module located in front of the mast arm. Use drop pipes/extenders of suitable length only when necessary to bring the bottom of the signal heads to a proper roadway clearance. Drop pipes/extenders shall be kept as short as necessary on backplated signals. Use of drop pipes/extenders greater than 1.5 feet in length must be approved by the Engineer. Use disconnect hangers for suspended heads only when specified.

632.06

On page 599, **Replace** the third paragraph with the following:

Orient each signal face to its traffic approach, and lock faces in place by the serrated or other type device incorporated in signal housing and support hardware. Before closing serrations, apply a bead of Room-Temperature Vulcanizing (RTV) silicone to all serrated surfaces and then tighten to achieve positive locking. RTV silicone shall be white to facilitate visual inspection. On heads with dual concentric serrated rings, completely fill the space between the rings with RTV silicone.

632.06

On page 599, **Add** the following paragraph after the third paragraph:

For span wire installations, do not use balance adjusters on one-way heads or tethered heads.

632.09

On page 599, **Revise** the first sentence in the first paragraph as follows.

632.09 Pedestrian Pushbutton and Accessible Pedestrian Pushbutton.

632.15

On page 601, **Replace** the first sentence of the first paragraph with the following:

632.15 Signal Support. Furnish supports with mast arms with the required pole and arm length, damping device if arm length requires, anchor bolt circle diameter, and anchor bolt size.

632.15

On page 601, **Replace** the fifth paragraph with the following:

Conform to the requirements of AASHTO LRFDLTS-1, including all interim releases.

632.24

On page 604, **Add** the following sentence at the end of the first paragraph:

This compensation is for invoiced cost without mark-up.

632.25

On page 604, **Replace** the first paragraph with the following:

Cover vehicular signal heads if erected at intersections where traffic is maintained before energizing the signals. Cover pedestrian signal heads when specified in the plans. Use a sturdy opaque covering material specifically made for use with traffic signals and ensure that the color of the cover is different than the signal head, tan or ~~beige~~ white, so that it is clear to drivers and pedestrians the heads are covered, not dark. Use a method of covering and cover attachment and materials as approved by the Engineer. Covers are to be free of text, pictures, or any type of advertising. Maintain covers and remove them when directed by the Engineer.

632.25

On page 604, **Add** the following paragraph after the second paragraph.

Do not operate covered signals at night and ensure no conflicting signal light is visible at night. Comprise covers of 16 oz./yd. vinyl-coated polyester fabric consisting of no more than 2 layers sewn together. Completely cover signal, including central slits or ports in the cover, any time no active work is occurring on the signal installation.

632.29

On page 606, **Revise** the first sentence in the second paragraph as follows.

The Department will measure Pedestrian Pushbutton and Accessible Pedestrian Pushbutton by the number of individual units and will include pedestrian pushbutton signs.

632.29

On page 607, **Replace** the first sentence of the fourth paragraph with the following:

The Department will measure Signal Support, Combination Signal Support, Strain Pole, Combination Strain Pole, Wood Pole, and Pedestal by the number of complete units of each, and will include pole arms, weather-heads and blind half couplings, damping device if arm length requires, anchor bolts and conduit ells furnished for foundations.

632.30

On page 608, **Add** after the "Pedestrian Pushbutton" pay item add the following pay item.

632 Each Accessible Pedestrian Pushbutton

633

On page 609, **Delete** the following from the table of contents:

~~**633.07 Controllers**~~

633

On page 609, **Delete** the following from the section index:

~~**633.06 Testing and Prequalification**~~

633

On page 609, **Delete** the following from the section index:

~~633.14 Centrally Controlled Arterial Traffic Signal System~~

633.01

On page 610, **Revise** the first sentence to the following.

This work consists of furnishing and installing traffic signal control equipment, including ~~controllers,~~ cabinets, auxiliary equipment, and specified accessories, completely wired, at the locations shown on the plans and ready for service.

633.03

On page 610, **Delete** the following from the last paragraph:

Furnish material and equipment conforming to:

Concrete (cabinet foundations and work pads)
QC Misc or QC 1 ..... 499, 511
Conduit 725.04, 725.051, 725.052
~~Controller unit ..... 733.02~~
Cabinet and auxiliary equipment 733.03
Cabinet riser 733.04
Flasher controller 733.05

~~Controller, master, traffic responsive..... 733.06~~
Remote monitoring station..... 733.07
Uninterruptible Power Supply..... 733.09

633.06

On page 611, **Delete** the entire section.

633.07

Beginning on page 611, **Delete** the entire section.

~~**633.07 Controllers.** Install controller units, consisting of the timing unit, software, and signal timing, into the specified type of prewired cabinet.~~

~~Program controller units as shown on the plans unless otherwise directed by the Engineer. If the plan timing data or the supplemental timing data supplied by the Engineer does not exactly fulfill the timing requirements of the installed equipment, notify, in writing, the Engineer of the problem and identify the discrepancies. The Engineer will consult with the maintaining agency and notify the Contractor within 2 weeks. After programming, briefly operate controllers, with the signals turned off by means of the signal shutdown switch, to ensure that operation is reasonable and conforms to the plans.~~

~~If the plans show two or more intersection controllers operated in a progressive signal system, coordinate signals by relating the various controller cycle start times to a zero time base, or other cycle start time at an adjacent signalized intersection. Ensure that the controller unit software provides coordination capability to allow associated controllers to be operated within the progressive traffic system. Coordination equipment shall supervise the operation of its associated controller by causing the end of certain phases and the beginning of the following phases to occur at set points. Program coordination timing according to the coordination timing data shown on the plans or provided by the Engineer.~~

633.13

On page 613, **Delete** the entire section.

~~**633.13 Controller, Master, Traffic Responsive.** The traffic responsive master controller supervises and controls the operation of an interconnected system of local controllers. Ensure that the master controller is able to communicate with a remote monitoring station. Locate this master controller in a local intersection controller cabinet unless otherwise shown on plans. If the local controller cabinet size is not sufficient to accommodate the master controller and its associated wiring, furnish the proper size cabinet for the local intersection controller to house the local controller, master controller, modem, and all auxiliary devices.~~

633.14

On page 613, **Delete** the entire section.

~~**633.14 Centrally Controlled Arterial Traffic Signal System.** Install this construction item on signal systems with a minimum of fifty (50) networked signalized intersections in jurisdictions who employ dedicated engineering and/or traffic signal operations staff. Install, test, and operate the station, consisting of computer equipment, communications equipment, and central control software, in one or more locations in the maintaining agency's facilities as shown in the plans. The maintaining agency shall furnish communications at these stations.~~

633.19

On page 614, **Delete** the first two paragraphs:

~~The Department will measure Controller Unit, Type ___, with Cabinet, Type ___ by the number of each complete unit, and will include controller unit with software, all required auxiliary equipment, loop detector units, and a prewired cabinet, with all items completely wired and tested. Ground mounted cabinets will include anchor bolts and conduit ells for installation in the foundation. Pole mounted cabinets will include pole mounting hardware.~~

~~The Department will measure Controller Unit, Type ___ by the number of each controller timing unit with software, and will include any signal timing programming or installation. The Department will measure Controller Unit, Type ___, Furnish Only by the number of each controller timing unit with software, and will exclude any signal timing programming or installation~~

633.19

On page 615, **Delete** the second paragraph:

~~The Department will measure Controller, Master, Traffic Responsive by the number of each unit, and will include installation, signal system software, programming, and any increase in cabinet size to house the master controller in the local intersection cabinet. The Department will measure Controller, Master, Traffic Responsive, Furnish Only by the number of each unit, and will include software, but exclude any programming or installation.~~

633.19

On page 615, **Delete** the third paragraph:

~~The Department will measure Centrally Controlled Arterial Traffic Signal System by the number of each location shown on the plans, and will include all equipment, testing, and software.~~

633.20

On page 615, **Delete** the following items:

~~633 Each Controller Unit, Type ___, with Cabinet, Type ___~~
~~633 Each Controller Unit, Type ___~~
~~633 Each Controller Unit, Type ___, Furnish Only~~
~~633 Each Controller, Master, Traffic Responsive~~
~~633 Each Controller, Master, Traffic Responsive, Furnish Only~~

633.20

On page 615, **Delete** the following:

~~633 Each Centrally Controlled Arterial Traffic Signal System~~

641

On page 627, **Revise** the table of contents to the following:

641.01 Description
641.02 Materials
641.03 General
641.04 Equipment
641.05 Pavement Preparation
641.06 Layout and Premarking
641.07 Line Placement Tolerance
641.08 Marking Types
641.09 Two-Way Radio Communication
641.10 Removal of Pavement Markings
641.11 Unsatisfactory Materials and Deduction for Deficiency
641.12 Method of Measurement

641.13 Basis of Payment

641.04

On page 629, **Replace** the first list with the following:

Measure and record application vehicle speed to nearest 0.1 MPH (0.16 km/h),
Measure and record weight or volume amount of material used by color,
Measure and record weight or volume amount of material used by line type,
Measure and record weight of glass beads,
Measure and record weight of wet reflective optics,
Measure and record pavement surface temperature,
Measure and record air temperature,
Measure and record dew point,
Measure and record humidity,
Calculate and record average material application rate and film thickness over the section painted.

641.04

On page 629, **Replace** the second list with the following:

Hand delivery of paper report,
Fax delivery of paper report,
E-mail of Excel spreadsheet file,
Flash drive transfer of Excel spreadsheet file.

641.04

On page 629, **Add** the following sentence after the second sentence of the first paragraph:

Continuous line equivalent is defined as 0.5 mile (0.8 km) of edge line, 0.25 mile (0.4 km) of double yellow center line, or 2 mile (3.2 km) of lane line.

641.05

On page 629, **Add** the following after the first sentence in the first paragraph:

Before applying marking material, the pavement surfaces must be completely dry. Test for moisture using the following test procedures, if needed as directed by the Engineer:

MOISTURE TEST

Tape a 12 inch (300 mm) square sheet of thin plastic to the road surface, sealing all edges.
After 15 minutes examine the side of the sheet facing the road surface.
If more than a sparse amount of moisture is present, do not apply marking material.

641.11

On page 632, **Revise** the header to the following:

641.11 Unsatisfactory Materials and Deduction for Deficiency.

641.11

On page 632, **Replace** the second paragraph with the following:

The Department will consider materials unsatisfactory if conformance to at least one of the following:

A. Deficiency of marking material or glass beads is 20 percent or more.

B. Materials applied outside the temperature or application requirements in Items 642, 643, and 646 without written approval of the Engineer.

C. Markings not meeting the performance parameters contained in Supplement 1047, Appendices C, D, E, ~~and~~ G, or a combination of the Appendices.

1. Numerical rating of 8 or lower for Daytime Color (Appendix C)
2. Composite rating of 8 or lower for Night Visibility (Appendix D)
3. Numerical rating of 9 or lower for Durability (Appendix E)
4. Less than the initial measurement for Retroreflectivity (Appendix G)

Replace pavement markings and glass beads in all sections determined to be unsatisfactory by retracing over the unsatisfactory markings at the full thickness specified in Items 642, 643 and 646.

642.02

On page 633, **Add** the following to the to the end of the first sentence of the first paragraph:

"in accordance with supplement 1089."

642.02

On page 633, **Revise** the third sentence of the second paragraph to the following:

Samples not meeting the manufacturer's production ranges will require the Contractor to re-apply, at his expense, any markings using that sample.

642.04

On page 633, **Add** the following after the first sentence of the second paragraph.

Furnish the Engineer documentation the material being delivered is within the manufacturer's recommended shelf life from the date of manufacture.

643.02

On page 636, **Add** the following to the to the end of the first sentence of the second paragraph:

"in accordance with supplement 1089."

643.04

On page 636, **Delete** the first sentence of the third paragraph.

~~After sampling of resin is completed, transfer the entire contents of each material container to the striper tanks.~~

644.01

On page 638, **Add** the following to the first paragraph:

644.01 Description. This work consists of furnishing and applying screed extruded or ribbon gun thermoplastic pavement markings according to Item 641, 740.01, 740.04, 740.09, and the additional requirements specified below.

644.02

On page 638, **Add** the following to the to the end of the first sentence of the second paragraph:

"in accordance with supplement 1089."

644.03

On page 638, **Replace** the first list with the following:

Measure and record application vehicle speed to the nearest 0.1 MPH (0.16 km/h).
Measure and record by line type.
Measure and record by color.
Measure and record weight of glass beads.
Measure and record weight of wet reflective optics.
Measure and record pavement surface temperature.
Measure and record air temperature.
Measure and record thermoplastic temperature in the kettle and at the point of application.

644.03

On page 639, **Add** the following sentence after the second sentence in the first paragraph:

Continuous line equivalent is defined as 0.5 mile (0.8 km) of edge line, 0.25 mile (0.4 km) of double yellow center line, or 2 mile (3.2 km) of lane line.

644.03

On page 639, **Replace** the sixth paragraph with the following:

Attach an automatic dispenser for glass beads, wet reflective optics, or both to the equipment so that the beads, optics, or both are immediately and uniformly dispensed over the marking surface. Equip the dispenser with an automatic cut-off control synchronized with the cut-off of the thermoplastic material

644.03

On page 639, **Replace** the seventh paragraph to the following:

Ensure that the application equipment applies lines with a square end and can apply broken lines. Use equipment that ensures uniformity in the thickness and width of lines. Furnish application equipment for applying markings that consists of dies of varying widths to produce different widths of lines. Do not use pans, aprons, or similar devices that the die overruns.

644.04

On page 640, **Replace** the fifth full paragraph with the following:

The Department will consider materials unsatisfactory if conformance to at least one of the following:

A. Deficiency of thermoplastic marking material or glass beads is 20 percent or more.

B. Materials applied outside the temperature or application requirements in 644.04 without written approval of the Engineer.

C. Markings not meeting the performance parameters contained in Supplement 1047, Appendices C, D, E, and G.

1. Numerical rating of 8 or lower for Daytime Color (Appendix C)
2. Composite rating of 8 or lower for Night Visibility (Appendix D)
3. Numerical rating of 9 or lower for Durability (Appendix E)
4. Less than the initial measurement for Retroreflectivity (Appendix G)

Replace thermoplastic markings and glass beads in all sections determined to be unsatisfactory by entirely removing the unsatisfactory thermoplastic material by grinding as per 641.10 and then reapplying at the full thickness specified in 644.04. Do not apply a layer of sprayed thermoplastic to sections determined to be unsatisfactory to achieve the required thickness.

646.02

On page 643, **Add** the following to the to the end of the first sentence of the second paragraph:
"in accordance with supplement 1089."

647.01

On page 648, **Add** the following to the first sentence of the first paragraph after "740.08":
, 740.09

647.02

On page 648, **Add** the following sentence after the second sentence:
Glass beads, Type E ……740.09

647.04.B.

On page 649, **Replace** the second sentence of the second paragraph with the following:
Drop-on glass beads are required.

647.04.C.

On page 649, **Replace** the second sentence of the second paragraph with the following:
Drop-on glass beads are required.

648.02

On page 650, **Add** the following to the to the end of the first sentence of the second paragraph:
"in accordance with supplement 1089."

648.03

On page 650, **Replace** the first list with the following:

Measure and record application vehicle speed to the nearest 0.1 mph (0.16 km/h).
Measure and record by line type.
Measure and record by color.
Measure and record weight of glass beads.
Measure and record weight of wet reflective optics.
Measure and record pavement surface temperature.
Measure and record air temperature.
Measure and record spray thermoplastic temperature in the kettle and at the point of application.

648.03

On page 651, **Replace** the sixth paragraph with the following:

Attach an automatic dispenser for glass beads, wet reflective optics, or both to the equipment so that the beads, optics, or both are immediately and uniformly dispensed over the marking surface. Equip the dispenser with an automatic cut-off control synchronized with the cut-off of the spray thermoplastic material.

648.03

On page 651, **Add** the following sentence after the second sentence in the first paragraph:

Continuous line equivalent is defined as 0.5 mile (0.8 km) of edge line, 0.25 mile (0.4 km) of double yellow center line, or 2 mile (3.2 km) of lane line.

648.04

On page 651, **Delete** the second sentence in the first paragraph and the table that follows the first paragraph:

~~Test for moisture using the following test procedures, if needed as directed by the Engineer:~~

~~MOISTURE TEST~~

~~Tape a 12 inch (300 mm) square sheet of thin plastic to the road surface, sealing all edges.~~
~~After 15 minutes examine the side of the sheet facing the road surface.~~
~~If more than a sparse amount of moisture is present, do not apply spray thermoplastic.~~

648.05

On page 652, **Replace** the sixth paragraph with the following:

The Department will consider materials unsatisfactory if conformance to at least one of the following:

A. Deficiency of spray thermoplastic marking material or glass beads is 20 percent or more.

B. Materials applied outside the temperature or application requirements in 648.05 without written approval of the Engineer.

C. Markings not meeting the performance parameters contained in Supplement 1047, Appendices C, D, E, and G.

1. Numerical rating of 8 or lower for Daytime Color (Appendix C)
2. Composite rating of 8 or lower for Night Visibility (Appendix D)
3. Numerical rating of 9 or lower for Durability (Appendix E)
4. Less than the initial measurement for Retroreflectivity (Appendix G)

Replace or reapply spray thermoplastic markings and glass beads in all sections determined to be unsatisfactory.

661.02

On page 676, **Revise** the first paragraph second sentence with the following.

Provide plant materials that are sourced from nurseries licensed by the Ohio Department of Agriculture or state equivalent, healthy specimens, typical of their species or variety, and that exhibit a normal habit of growth as set forth in the most current edition of the American Standard for Nursery Stock (ANSI Z60).

661.06

On page 676, **Add** the following sentence in the first paragraph after the second sentence.

Stockpiled materials can be inspected by ODA with advanced notice.

700.00

On Page 687 **Add** the following table row after specification 409:

421	Microsurfacing Emulsion and Tack Coat	CSS-1hM: Certified Material. At the refinery or source as directed by OMM. Project and/ or Plant Sample per 421.12. Non-certified material is sampled and approved by OMM before use. 421 Tack Coat per 421.09: Project and/ or Plant Sample per 421.12.	CSS-1hM: Certified material: Submit to OMM. Non-certified material: Submit to OMM. Do not use until approved. 421 Tack Coat per 421.09. Dilute per 421.09. Do not use

		Tag and ship sample to the District lab for OMM Asphalt section testing. Document in SM.	non-certified material to dilute.

700.00

On page 689, **Revise** the table line with the following:

661	Planting Trees Shrubs, Perennials and Vines	Only accept materials from licensed nurseries. See OMM website for list of Ohio Department of Agriculture list of licensed suppliers. Inspect material for condition. Plant material should be sealed until used. Document in SM .	Final acceptance should take place after period of establishment. Notify District Testing if rejecting material.

700.00

On Page 689, for Spec. Number 701.11, **Replace** "Ground Granulated Blast Furnace Slag (GGBFS)" with "Slag Cement".

700.00

On Page 689, for Spec. Number 701.13 **Replace** "Fly Ash" with "Fly Ash/Natural Pozzolan".

700.00

On Page 689 **Add** the following to the 701.01 row:

701.01 701.02 701.04 701.05 701.07 701.09 701.15	Cement, Hydraulic ASTM Types I, IA, II, III, IL, Masonry Type IS(<25)	Verify manufacturer on Concrete Plant Batch Ticket is on Certified List for Supplement 1028 maintained by OMM. Verify material against bill of lading description. Document in SM.	

700.00

On Page 690 **Replace** the second full table row with the following:

702.02 702.03 702.04 702.07 702.12 702.13	Cut Back Asphalt Cut Back Asphalt Emulsions Emulsified Asphalts Asphalt Emulsion MWS	Certified material: At the refinery or source as directed by OMM. Project and/ or Plant: One sample per each 25,000 gallons. None for less than 300 gallons. Non-certified material:	Certified material: Submit to OMM. Non-certified material: Submit to OMM. Do not use until approved.

	Non-Tracking Asphalt Emulsion SBR Asphalt Emulsion	Will be sampled and approved by OMM before use. 702.13 – Provide Certified Test Data per specification requirements.	

700.00

On Page 690 **Add** the following table row after the third full table row:

702.08	Cold Liquid-Applied Elastomeric Waterproofing Membrane	Provide Certified Test Data per specification requirements.	

700.00

On Page 693 **Add** the following row after 705.26:

705.27	Carbonate Micro-fines	Verify manufacturer on Concrete Plant Batch Ticket is on Certified List for S 1016 maintained by OMM. Verify material against bill of lading description. Document in SM	

700.00

On page 696, **Replace** 707.11 with the following:

707.11	Polymer-precoated corrugated steel spiral rib pipe	Products will be supplied by a source on the Certified List for S 1019 maintained by OMM. Receive with TE-24. Check dimensions and markings. Document in SM.	Notify District Testing and OMM Structural Welding and Metals section, if rejecting material because material non-performs or looks defective during use.

700.00

On page 703, **Replace** 712.11 with the following

712.11	Temporary Erosion Control Mats Material [Types A through I]	Inspect material for condition and dimension. ~~Manufacturer's certified test data required for acceptance.~~ Field Acceptance item.	Notify District Testing if rejecting material.

700.00

On page 705, **Replace** 725.11 B, 725.11 E, 725.11 F, and 725.11 G with the following.

725.11 B	Lamps for Luminaires	Inspect for condition, markings and conformance to plan requirements. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.

725.11 E	Conventional Luminaires for High Intensity Discharge Lamps (including Optical system, lamp, ballast and housing)	Inspect for condition, dimension, markings and conformance to plan requirements. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.
725.11 F	Wall Mounted Underpass Luminaires (including Optical system, lamp, ballast and housing)	Inspect for condition, dimension, markings and conformance to plan requirements. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.
725.11 G	High Mast/Low Mast Luminaire (including Optical system, lamp, ballast and housing)	Inspect for condition, dimension, markings and conformance to plan requirements. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.

700.00

On page 706, **Replace** 725.20 with the following:

725.20	Multiple Cell Conduit and Fittings	Verify type and brand name of material is on QPL at the time of use. Inspect for condition, dimension, markings and conformance to plan requirements. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.

700.00

On page 709, **Add** the following after 730.23:

730.24	Digital Printing	No field acceptance requirements.- part of 730.19,191,192 or 193 items.	

700.00

On page 709, **Revise** the table line with the following:

732.06	Pedestrian Pushbuttons and Accessible Pedestrian Pushbutton	Verify type and brand name of material is on TAP at the time of use. Inspect for conformance to dimension and condition. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.

700.00

On page 709, **Delete** 732.07 A from the table:

~~732.07.A~~	~~Loop Detector Units NEMA TS 1~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to dimension and condition.~~ ~~Document in SM.~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use notify District Testing and OMM.~~

700.00

On page 710, **Delete** 732.08 from the table:

~~732.08~~	~~Loop Detector Units, Delay and Extension Type~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to dimension and condition.~~ ~~Document in SM.~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use notify District Testing and OMM.~~

700.00

On page 711, **Delete** 733.02 E, 733.02 F, and 733.03 A from the table:

~~733.02. E~~	~~Controller Unit Type 2070L~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to dimension and condition.~~ ~~Document in SM.~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use notify District Testing and OMM.~~
~~733.02. F~~	~~Controller Unit Type 2070E~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to dimension and condition.~~ ~~Document in SM.~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use notify District Testing and OMM.~~

~~733.03.A~~	~~Cabinet Type TS 1~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to dimension and condition.~~ ~~Document in SM.~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use notify District Testing and OMM.~~

700.00

On page 711, **Delete** 733.02.C, 733.02.D, 733.02.G, and 733.06 from the table:

~~733.02.C~~	~~Controller Unit Type TS2/A1~~	~~Verify type and brand name of material is on TAP at the time of use.~~ ~~Inspect for conformance to~~	~~Notify District Testing if rejecting material.~~ ~~If material non-performs or looks defective during use~~

		~~dimension and condition. Document in SM.~~	~~notify District Testing and OMM.~~
~~733.02.D~~	~~Controller Unit Type TS2/A2~~	~~Verify type and brand name of material is on TAP at the time of use. Inspect for conformance to dimension and condition. Document in SM.~~	~~Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.~~
~~733.02.G~~	~~Controller Unit Type 2070LX~~	~~Verify type and brand name of material is on TAP at the time of use. Inspect for conformance to dimension and condition. Document in SM.~~	~~Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.~~
~~733.06~~	~~Controller, Master, Traffic Responsive~~	~~Assure the same manufacturer as the supplied controller unit 733.02.~~	~~Notify District Testing if rejecting material.~~

700.00

On page 711, **Revise** 733.03 D as follows:

733.03 D	Cabinet Type 336L	Verify type and brand name of material is on TAP at the time of use. Inspect for conformance to dimension and condition. Document in SM.	Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.

700.00

On page 711, **Delete** 733.03 E:

~~733.03.E~~	~~Cabinet Type 336~~	~~Verify type and brand name of material is on TAP at the time of use. Inspect for conformance to dimension and condition. Document in SM.~~	~~Notify District Testing if rejecting material. If material non-performs or looks defective during use notify District Testing and OMM.~~

700.00

On page 711, **Revise** 733.04 A as follows:

733.04 A	Cabinet Riser for ~~TS 1~~ TS-2 cabinet	Field inspect for 1/4 aluminum thickness and accept.	Notify District Testing if rejecting material.

700.00

On page 712, **Revise** 733.07 to the following:

733.07	Remote Monitoring Station	Compatible with the supplied ~~733.02 and 733.06~~ Supplemental Specification 809.10.G unit.	Notify District Testing if rejecting material.

701.00

On Page 714 **Replace** section 701.00 with the following:

701.00 Acceptance. Provide cements meeting 701.01, 701.02, 701.04, 701.05, 701.07 and 701.09 and certified according to Supplement 1028; fly ash or natural pozzolan meeting 701.13 and certified according to Supplement 1026; slag cement meeting 701.11 and certified according to Supplement 1034; and micro silica meeting 701.10 and certified according to Supplement 1045, without prior sampling, testing and approval by the Department. Lists for certified cement, fly ash, natural pozzolan, slag cement and micro silica sources are maintained by the Laboratory.

701.11

On Page 714 **Replace** section 701.11 with the following:

701.11 Slag Cement. Provide slag cement according to ASTM C 989, Grade 100 minimum.

701.13

On Page 714 **Replace** the first paragraph of section 701.13 with the following:

701.13 Fly Ash or Natural Pozzolan for Use in Portland Cement Concrete. Provide fly ash or natural pozzolan according to ASTM C 618, Class C, F, or N, except ensure a maximum loss on ignition (LOI) of 3 percent for fly ash and 5 percent for natural pozzolan.

701.15

On Page 714, **ADD** the following after the last paragraph of 701.13:

701.15 Portland-limestone Cement, Type IL. Provide portland-limestone cement according to ASTM C 595, Type IL. The maximum allowable limestone content is fifteen percent by mass. Do not use Type IL when Type II is specified.

702.01

On Page 715, **Replace** the first sentence with the following:

General. According to AASHTO M 320-10 Table 1 and Supplement 1105 except as follows.

702.01

On Page 716, **Add** before the next-to-last sentence of the first full paragraph the following:

Do not use paraffin wax, organic wax, or like materials.

702.01

On Page 716, **Add** the following sentence after the fourth sentence in the second full paragraph (5.3):

Do not use recycled engine oil bottoms (REOB), vacuum tower asphalt extender (VTAE), or like materials as modifiers.

702.01

On Page 716 **Replace** the sixth full paragraph with the following:

5.7 Ensure that PG 64-22 has a Penetration (AASHTO T49) of no more than 80.

702.09

On Page 721 **Add** new section 702.09 before 702.12 as follows:

702.09 Hot Applied Asphaltic Joint Adhesive. Provide hot applied asphaltic joint adhesive meeting the following requirements:

Table 702.09-1

Test	Description	Requirement
ASTM D 3236	Brookfield Viscosity @ 400°F (205°C)	4,000 - 10,000 CP
ASTM D 5329	Cone Penetration @ 77°F (25°C)	60-100 dmm
ASTM D 5329	Flow @ 140°F (60°C)	5 mm Max.
ASTM D 5329	Resilience @ 77°F (25°C)	30% Min.
ASTM D 113	Ductility @ 77°F (25°C)	30 cm Min.
ASTM D 113	Ductility @ 39.2°F (4°C)	30 cm Min.
ASTM D 5329	Tensile Adhesion @ 77°F (25°C)	500% Min.
AASHTO T 53	Softening Point	170°F Min.
ASTM D 5329	Asphalt Compatibility	Pass

Furnish hot applied asphaltic joint adhesive according to the Department's TE-24.

702.12

On Page 721, **Replace** the section with the following:

702.12 Non-Tracking Asphalt Emulsion. Provide certified non-tracking asphalt emulsion material meeting Table 702.12-1 and Supplement 1128 and Supplement 1032. Emulsion will comply with all specification requirements for at least 30 days after sample date.

Table 702.12-1

Tests on emulsion, AASHTO T 59, unless otherwise designated:	
Viscosity, Saybolt Furol at 77 °F (25 °C) (SFS)	20 to 100
Storage Stability Tests, 24-hr (% difference), max.	1.0
Settlement tests, 5-day (% difference), max.	5.0
Sieve Tests (%) (Distilled Water), max.	0.30
Distillation, Residue % solids, min. [1]	50
Oil distillate, %, max.	3

[1] Products may use residual by evaporation to perform residual and may use the material to perform residual tests but must be submitted during approval process in S-1128. Will be required to perform residual by distillation to obtain oil distillate %.

702.16

On Page 722, **Replace** the entire section with the following:

702.16 Polymer Emulsified Binder. Material will meet specification requirements of the table below.

TABLE 702.16 POLYMER EMULSIFIED BINDER

Tests on Emulsion (AASHTO T 59)**:**	**Type A (b)**	**Type B (c,g)**	**Type C (h)**
Saybolt Furol Viscosity (g)	120-550 (50 ºC)	20-100 (25 ºC)	20-100 (25 ºC)
Storage stability, 24 hrs., % difference, max (a)	1	1	1
Demulsibility, 35 ml of 0.8% Dioctyl Sodium Sulf., min	50	60	
Demulsibility, 35 ml of 0.02N, CaCl2, %, min		60	
Particle Charge Test	Positive		Positive
Sieve test, (distilled water), %, max	0.1	0.05	0.10
Distillation to 177 ºC, residue % solids (d)	66	63	62
Oil distillate, %, max	2	2	
Tests on Distillation Residue:			
Penetration, 100g, 5 sec @77 ºF(25ºC) AASHTO T 49	70-125	90-150	40-90
Softening point, º C, min AASHTO T 53	57		60
Solubility, %, min AASHTO T44 or ASTM D7553 (i)	97.5	97.5	97.5
Elastic Recovery, 50 ºF (10º C), %, min AASHTO T 301, (e),(f)	60	58	50
Ductility, 25 °C, 5 cm/min, (cm), min. AASHTO T 51			40

(a) After standing undisturbed for 24 hours, the surface will show no white, milky colored substance, but will be a smooth homogeneous color throughout.
(b) CRS-2P, test within 20 days of project sampling. Limits for both certified source and project samples.
(c) CRS-1P and HFRS-1P, test within 20 days of project sampling. Limits for both certified source and project samples.
(d) See Supplement 1013. For Type C if natural latex is used, use the Oven Evaporation method in AASHTO T 59 in place of distillation and use this residue for further testing.
(e) Straight molds. Hold at test temperature for 90 minutes. Place in ductilometer and elongate 20 cm at 5 cm/min. Hold for 5 minutes and cut. After 1 hour retract the broken ends to touch and note elongation in cm (X) to the nearest 0.01cm. Percent Recovery = ((20-X)/20) x 100. Report elastic recovery to nearest 0.1%.
(f) SBR, SBS, & SB
(g) Minimum of 70 SFS for project acceptance
(h) CSS-1hM, test within 30 days of sampling. Limits for both certified source and project samples. Do not use port addition of the polymer to the emulsified asphalt. Include the percent residue on the Bill of Lading.
(i) On base asphalt only

703.05.C

On page 733, **Add** the following sentence to the end of the paragraph:

Should the sample contain less than 10 percent of any of the sizes specified in AASHTO T104 Section 5.1, that individual size shall not be held to the above maximum loss requirement.

705.01

On page 747, **Replace** the section with the following:

705.01 Glass Fiber Reinforced Polymer (GFRP) Dowel Bars. Furnish round and straight fiber reinforced polymer (GFRP) dowel bars. Ensure resin used to manufacture the GFRP bars consists of

an epoxy vinyl ester resin. Ensure the glass fiber used is ECR glass which meets ASTM D578. Ensure that the minimum glass fiber content is 70 percent by weight. Furnish dowel bars of a type meeting the dimensional requirements of the standard construction drawings. Provide certified test data according to 101.03 with each shipment.

705.28

On page 757, **Add** the following section:

705.28 Glass Fiber Reinforced Polymer (GFRP) Deformed Bars. Furnish GFRP reinforcement according to ASTM D7957 except as noted. Furnish deformed bars of a type meeting the dimensional requirements of the standard construction drawings. Furnish certified material according to Supplement 1138.

The Mean Tensile Modulus of Elasticity limit (ASTM D7957 Table 1) shall meet or exceed 8700 ksi (60 GPa).

The Mean Ultimate Tensile Strain limit (ASTM D7957 Table 1) shall meet or exceed 1.4%.

The Tensile Modulus of Elasticity limit (ASTM D7957 Table 2) shall meet or exceed 8700 ksi (60 GPa).

The Ultimate Tensile Strain limit (ASTM D7957 Table 2) shall meet or exceed 1.4%.

The Minimum Guaranteed Ultimate Tensile Force (ASTM D7957 Table 3) shall be as follows:

Bar Designation No	Minimum Guaranteed Ultimate Tensile Force Kip (kN)
2 (M6)	6.1 (27)
3 (M10)	13.2 (59)
4 (M13)	27.6 (123)
5 (M16)	36.6 (163)
6 (M19)	51.9 (231)
7 (M22)	68.5 (305)
8 (M25)	89.9 (400)
9 (M29)	124 (550)
10 (M32)	138 (615)

705.29

On page 758, **Add** the following section:

705.29 Synthetic Fibers for use in Portland Cement Concrete. Provide Type III synthetic, non-metallic fibers in accordance with ASTM C 1116 and ASTM D7508 with the following exceptions:

1. Aspect Ratio – Length/Equivalent Diameter, min…….70 – 100

   max……100
2. Tensile Breaking Strength, min…….70,000 psi (482 MPa)
3. Modulus of Elasticity, min…….800,000 psi (5515 MPa)
4. Length: 1.5 inches (38 mm) to 2.25 inches (57 mm)
5. Dosage Rate: Minimum of 4 pounds per cubic yard (2.4 kg/m^3)

Test the synthetic fibers in accordance with ASTM C 1609 and ASTM C 1579 utilizing an AASHTO-accredited laboratory for portland cement concrete materials and in accordance with the following table:

Required Hardened Fiber Reinforced Concrete Properties

Physical Test	Specification	Requirement
Equivalent Flexural Strength Ratio ($R_{T,150}^{150}$)*	ASTM C 1609	Minimum of 25%
Crack Reduction Ratio (CRR)	ASTM C 1579	Minimum reduction >85%
*Test specimens when the concrete flexural strength at first crack (f_1) is a minimum of 600 psi. For 6 inch x 6 inch x 20 inch fiber reinforced beam the maximum required net deflection value of L/150 of the 18 inch span length is 0.12 inch.		

Furnish materials according to the Department's QPL.

706.05

On page 772, **Replace** the second paragraph with the following:

7.1 For the following box sizes, span by rise, refer to ASTM C1577: 6x4, 5, 6; 7x4, 5, 6, 7; 8x4, 5, 6, 7, 8; 9x4, 5, 6, 7, 8, 9; 10x4, 5, 6, 7, 8, 9, 10; 11x4, 5, 6, 7, 8, 9, 10, 11; and 12x4, 5, 6, 7, 8, 9, 10, 11, 12 feet. For the following box sizes, span by rise, refer to SS940: 14x4, 5, 6, 7, 8, 9, 10; 16x4, 5, 6, 7, 8, 9, 10; 18x4, 5, 6, 7, 8, 9, 10; and 20x4, 5, 6, 7, 8, 9, 10 feet.

707.01

On page 788, **Replace** the table with the following:

Pipe			Pipe-Arch	
Diameter	**Wall Thickness**		**Size**	**Wall Thickness**
(inch)	**(inch)**		**(inch)**	**(inch)**
6	0.052			
8	0.064			
10	0.064			
12	0.064			
15	0.064		17 × 13	0.064
18	0.064		21 × 15	0.064
21	0.064		24 × 18	0.064
24	0.064		28 × 20	0.064
27	0.064			
30	0.064		35 × 24	0.064
33	0.064			
36	0.064		42 × 29	0.064
42	0.064		49 × 33	0.079
48	0.064		57 × 38	0.109
54	0.079		64 × 43	0.109
60	0.109		71 × 47	0.138
66	0.138		77 × 52	0.168
72	0.138		83 × 57	0.168
78	0.168			
84	0.168			

707.01

On page 789, **Replace** the first table with the following:

Pipe	
Diameter	**Wall Thickness**
(mm)	**(mm)**
150	1.32
200	1.63
250	1.63
300	1.63
375	1.63
450	1.63
525	1.63
600	1.63
675	1.63
750	1.63
825	1.63
900	1.63
1050	1.63
1200	1.63
1350	2.01
1500	2.77
1650	3.51
1800	3.51
1950	4.27
2100	4.27

Pipe-Arch	
Size	**Wall Thickness**
(mm)	**(mm)**
430 × 340	1.63
530 × 380	1.63
610 × 460	1.63
710 × 510	1.63
885 × 610	1.63
1060 × 740	1.63
1240 × 840	2.01
1440 × 970	2.77
1620 × 1100	2.77
1800 × 1200	3.51
1950 × 1320	3.51
2100 × 1450	4.27

707.11

On page 792, **Revise** the following to:

707.11 Polymer-Precoated Corrugated Steel Spiral Rib Conduits. Provide conduits that have a center-to-center rib spacing of 7 1/2 inches (190 mm). Provide conduits and fittings according to AASHTO M 36, Type IR, with the following modifications:

6.1 Fabricate pipe from polymer-precoated, on both sides, steel sheet according to AASHTO M 246.

7.2.2 The ribs shall conform to AASHTO M 196, Section 7.2.2.

7.7.1 Reroll the ends of the individual pipe sections to form at least two annular corrugations on each end. Paint the rerolled end with zinc rich paint.

8.1.2 Ensure that the minimum wall thickness (coated) of steel pipe is as follows:

Pipe

Diameter (inch)	Wall Thickness (inch)		Diameter (mm)	Wall Thickness (mm)
18	0.064		450	1.63
21	0.064		525	1.63
24	0.064		600	1.63
30	0.064		750	1.63
36	0.064		900	1.63
42	0.064		1050	1.63
48	0.064		1200	1.63
54	0.079		1350	2.01
60	0.079		1500	2.01
66	0.109		1650	2.77
72	0.109		1800	2.77
78	0.109		1950	2.77
84	0.138		2100	3.51
90	0.138		2250	3.51

9.1 Coupling bands shall have annular corrugations.

9.2 Coupling bands shall conform to 707.01.

9.3 A bell and spigot joint according to ASTM A 760 (A760M) may be used with the following modifications:

9.3.1 These joints may be used for conduits ranging in size from 18 (450mm) to 48 (1200mm) inches in diameter.

9.3.2 Ensure the bell and spigot has a soil tight joint by use of a shop applied gasket on the bell end and a field applied gasket on the spigot end.

9.3.3 Provide a minimum of 0.064 (1.63mm) inch nominal sheet thickness or not more than two (2) nominal sheet thickness thinner than the thickness of the pipe to be joined.

14.1 Ensure that the certification and sampling conform to 707.01.

707.12

On page 793, **Replace** the table with the following:

Pipe

Diameter (inch)	Wall Thickness (inch)		Diameter (mm)	Wall Thickness (mm)
18	0.064		450	1.63
21	0.064		525	1.63
24	0.064		600	1.63
30	0.064		750	1.63
36	0.064		900	1.63
42	0.064		1050	1.63
48	0.064		1200	1.63
54	0.079		1350	2.01
60	0.079		1500	2.01
66	0.109		1650	2.77
72	0.109		1800	2.77
78	0.109		1950	2.77
84	0.138		2100	3.51
90	0.138		2250	3.51

707.62

On page 802, **Replace** the first paragraph with the following:

Polypropylene Corrugated Single Wall Pipe. Provide polypropylene corrugated single wall pipe for drainage pipe from 3 to 30-inch diameters according to ASTM F 3219, with the following modification:

707.65

On page 803, **Replace** the entire section with the following:

707.65 Corrugated Polypropylene Smooth Lined Pipe. Provide smooth lined corrugated polypropylene pipe, closed profile polypropylene pipe, couplings, and fittings according to AASHTO M 330, Type S or Type D, with the following modification:

12.1 Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.

707.69

On page 803, **Delete** the entire section:.

~~**707.69 Polypropylene Triple Wall Pipe.** Provide polypropylene triple wall pipe and fittings from 12 to 60-inch diameters according to AASHTO M 330 with the following modification:~~

~~12.1Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.~~

708.01

On Page 804, **Replace** the second paragraph with the following:

5.1 A green colorant approximately AMS-595A-34159.

708.02 B.1.f

On page 804, **Replace f.** with the following.

f. Color. Greenish gray, approximating AMS-595A-34159**,** visual comparison.

708.02 C.1.a

On page 805, **Replace a.** with the following.

a. Color. White, meeting or exceeding, AMS-595A-37875 according to ASTM E 1347.

708.02 D.1.a

On page 806, **Replace a.** with the following.

a. Finish, Specular gloss, ASTM D 523. Use AMS-595A-16440 Gray: 70 % minimum after 3000 hours weathering resistance. Color change less than 2.0 ΔE*, (C.I.E 1976 L*a*b*) ASTM D2244.

708.02.D.1.f

On page 806, **Replace f.** with the following:

f. Colors.

(1) Specified.[2]

Brown	AMS-595A, 10324
Green	AMS-595A, 14277
Blue	AMS-595A, 15526

[2] If not defined in the plans, the Engineer will specify from the list.

(2) Elective. As specified on the plans.

709.00 5.1

On page 808, **Replace** section 5.1 with the following:

5.1 Ensure that steel reinforcing bars to be coated are deformed and conform to 709.01, 709.03, or 709.05, and are free of oil, grease, or paint.

710.06

On page 815, **Replace** the first sentence of the first paragraph with the following:

Furnish deep beam rail according to AASHTO M 180, Type II or VI, Class A, with the following modifications:

710.12

On page 816, **Revise** the first paragraph with the following.

710.12 Square-Sawed and Round Guardrail Posts. Furnish pressure treated sawed posts of a timber grade in accordance with AASHTO M 168, 710.14, and 712.06. Furnish round guardrail posts according to 710.12, 710.14, and 712.06. Cut posts from growing timbers that are free from unsound or loose knots and rot and from injurious or excessive shake, and season checks that exceed 1/4 inch (6 mm) in width.

710.12

On page 816, **Delete** the last paragraph.

~~Furnish square sawed posts that are free from injurious cross grain and sapwood.~~

710.14

On page 817, **Revise** the first paragraph with the following.

710.14 Pressure Treated Guardrail and Fence Posts, Braces, and Blocks. Furnish pressure treated guardrail and fence posts, braces, and blocks according to AASHTO M 133 and 710.11, 710.12, and 712.06.

710.16

On page 817, **Revise** the first paragraph with the following.

710.16 Guard Posts. Furnish pressure treated wood posts according to 710.14. Furnish posts that are either sawed 5 by 6 in (125 by 150 mm) in cross section or 5 1/2 in + 1/2 in (138 mm) diameter round when measured 30 inches (0.75 m) from the top. Furnish posts that are 5 feet, 3 inches (1.6 m) in length and are embedded such that 30 inches (0.75 m) remains exposed. Ensure that the center-to-center spacing is spaced at 6 feet (1.8 m) intervals, unless otherwise shown on the plans.

712.06.E

On page 827, **Revise** the first and second paragraphs with the following.

E. Incising. Incise Douglas Fir lumber 3 inches (75 mm) or more thick on all four sides. Incise lumber less than 3 inches (75 mm) thick on the wide faces only, except as shown on the plans.

Incise Douglas fir with a minimum dimension of 2 inches (50 mm) using a suitable power-driven machine before treatment. Southern Yellow Pine is not required to be incised.

712.06.F

On page 827, **Replace** the first paragraph with the following.

F. Amount of Preservative. Pressure preservative treat all species of structural timber, lumber, piling, posts, and blocks in accordance with the appropriate AWPA U1 Commodity Standard or AASHTO M 133.

712.06.H

On page 828, **Revise** the [a] section below the table with the following.

[a] Sizes shown are nominal dressed sizes

The sweep must not exceed .08 foot in 10 feet.

Sawn wood sign posts must be graded per the following:

Southern Pine Inspection Bureau (SPIB) Standard Grading Rules
Western Wood Products Association (WWPA) Standard Grading Rules
West Coast Lumber Inspection Bureau (WCLIB) Standard Grading Rules

Posts must be treated per current AASHTO M 133: Preservatives and Pressure Treatment Processes for Timber standards and AWPA U1 Commodity Specification A.

Douglas fir and Hem-Fir posts must be incised prior to treatment.

Inspection shall be in accordance with AWPA M2.

Quality control shall be in accordance with AWPA M3.

Care and field treatment of the posts shall be in accordance with AWPA M4.

712.12

On page 833, **Add** the following to the section:

712.12 Tied Concrete Block Mat. Furnish materials tested according to ASTM D6460 with a minimum un-vegetated shear stress value of 12 psf with Type 1 Underlayment. The Department will determine acceptance based on independent third-party test data. Furnish materials with the following underlayment options:

Type 1 Underlayment: Temporary Erosion Control Mat

Type 2 Underlayment: Temporary Erosion Control Mat and Turf Reinforcing Mat

Furnish products according to the Department's QPL.

712.16

On page 835, **Insert** Item 712.16 after the last paragraph of Item 712.15:

712.16 Prefabricated Geocomposite Drain (PGD). Furnish Prefabricated Geocomposite Drain (PGD) consisting of a drainage core with geotextile fabric bonded to one side. Use drainage core material consisting of a preformed, stable, polymer plastic material with a cusped or geonet structure. Use drainage core that supports the geotextile and provides a bonding surface for the geotextile at intervals not exceeding 1-1/8 inches (29 mm) in any direction. Supply core that provides at least 14 square inches per square foot of flat area in contact with the geotextile.

Furnish a geotextile fabric composed of over 85% of polyester, polypropylene, polyolefin, or polyamide fibers by weight, that are formed into a stable network to ensure the performance during handling, installation, and service life. Use geotextile fabric that is resistant to chemical attack, rot, and mildew. Use geotextile fabric that is free of treatments or coatings that would adversely change the hydraulic properties of geotextile after installation. Furnish PGD that has the geotextile fabric covering the full length of the drainage core and has minimum 3 inch (76 mm) wide flaps/flanges of fabric extending beyond both longitudinal edges of the drainage core. Do not supply PGD that has ripped or torn geotextile fabric.

Furnish PGD in rolls, or in another acceptable manner, wrapped with an opaque, waterproof wrapping. Label or tag each roll or package to provide product identification sufficient to determine the product type, manufacturer, quantity, lot number, roll number, and date of manufacture. Prior to installation, protect the PGD from mud, dirt, dust, debris, harmful ultraviolet light, direct sunlight or temperature greater than 140 ˚F (60 ˚C). Furnish 3 inch (76 mm) wide, plastic tape for the sealing, seaming, and splicing the PGD. Furnish waterproof tape designed for underground applications that provides a strong bond that does not deteriorate over time in a buried condition. Furnish fittings and accessories provided by the manufacturer if available.

Submit Certified Test Data showing the product will meet or exceed the requirements listed in Tables 712.16-1 and 712.16-2.

TABLE 712.16-1 REQUIRED PGD CORE PROPERTIES

Property	**Test Method**	**Unit**	**Required Value**		
			Conventional Abutment/Wall Height		
			<10 ft (3m)	**10 to 30 ft (3 to 9m)**	**30 to 50 ft (9 to 15m)**
Thickness	ASTM D5199	in (mm)	0.4 to 1.0 (10 to 25)		
Minimum Compressive Strength	ASTM D1621	psf (kPa)	4625 (221)	10625 (508)	16625 (796)
Minimum In-Plane Flow Rate*	ASTM D4716	gal/min/ft (l/min/m)	5 (62)	15 (186)	25 (310)

* Tested under a confining pressure of 3,600 psf (172 kPa) and a hydraulic gradient of 1.0.

TABLE 712.16-2 REQUIRED PGD GEOTEXTILE PROPERTIES

Property	Test Method	Unit	Required Value		
			Percent *In Situ* Soil Passing 0.075 mm		
			<15	15 to 50	>50
Minimum Permittivity	ASTM D 4491	sec^{-1}	0.5	0.2	0.1
Apparent Opening Size	ASTM D 4751	mm	AOS ≤ 0.43	AOS ≤ 0.25	AOS ≤ 0.22
Minimum Grab Strength	ASTM D 4632	lb (N)	157 (700)		
Maximum Elongation	ASTM D 4632	%	50		
Minimum Trapezoidal Tear Strength	ASTM D 4533	lb (N)	56 (250)		
Minimum Puncture Strength	ASTM D 6241	lb (N)	309 (1375)		
	or ASTM D 4833	lb (N)	58 (260)		

720.01

On page 836, in the second paragraph, **Replace** "730.192 or 730.192" with "730.192 or 730.193"

721.01

On page 836, **Add** the following sentence as the first sentence of the first paragraph:

Furnish castings conforming to Supplement 1062.

721.02

On page 836, **Add** the following sentence as the first sentence of the first paragraph:

Furnish prismatic retroreflectors conforming to Supplement 1062.

721.03

On page 836, **Replace** the section in its entirety with the following:

721.03 Casting Adhesive. Furnish casting adhesives that conform to Supplement 1062.07 - Raised Pavement Marker Casting Adhesive Acceptance Procedure.

Only furnish material listed on the Department's QPL.

725.11.B

On page 841, **Delete** the third paragraph.

725.11.E

On page 843, **Delete** the second paragraph.

725.11.F

On page 843, **Delete** the seventh paragraph.

725.11.G

On page 844, **Delete** the fifth paragraph.

725.19.H

On page 847, **Revise** the first paragraph second sentence to the following:

Ensure that the pole and any cross arms or pole key is Southern Pine or Western Red Cedar, full length, pressure treated in compliance with specifications of the American Wood Protection Association or AASHTO M-133.

725.20

On page 848, **Replace** the entire section with the following:

725.20 Multiple Cell Conduit and Fittings. Ensure that fittings are factory made couplings that couple inner ducts and the outer conduit simultaneously, maintain the continuity and indexing of the inner ducts and are of a push fit design mechanically locked in place.

Furnish materials according to the Department's QPL.

A. Polyvinyl Chloride. Ensure that the multiple cell conduit consists of inner ducts conforming to NEMA TC-8 type DB in an outer conduit conforming to NEMA TC-2 (type EPC-40 or EPC-80 as specified except that size shall be the true inside diameter) in a factory preassembled unit.

B. High Density Polyethylene. Ensure that the multiple cell conduit consists of inner ducts conforming to ASTM F2160 with smooth or ribbed inside, and Superglide permanent friction layer, in an outer conduit conforming to ASTM F2160 in a factory preassembled unit.

725.21

On page 848, **Revise** the first sentence to the following:

Ensure that the complete luminaire support from the luminaire(s) down through the connection to the foundation or other structure to which the luminaire support is attached conforms to the requirements of AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals* LTS-6 (2013), except that the 40% hand-hole width criterion of 11.9.2 is not required.

725.22

On page 854, **Revise** the section to the following:

725.22 Underground Warning / Marking Tape. Furnish tape that is an inert material, at least 5 inch (125 mm) wide ~~approximately 6 inch (150 mm) wide~~ composed of polyethylene or polypropylene plastic, highly resistant to alkalis, acids or other chemical components likely to be encountered in soils. Furnish tape in accordance with the ORC 3781.29 color code and with black identifying lettering in accordance with Table 725.22-1 printed on one side only.

Table 725.22-1 Underground Utility Facility Color Codes

Identifying Lettering	Color
ELECTRIC	Red
GAS	Yellow
COMMUNICATION	Orange
WATER	Blue
SEWER	Green

Furnish tape in continuous rolls with the identifying lettering repeated continuously the full length of the tape. Furnish tape with a break strength of at least 3000 lb (1361 kg) when tested to ASTM D6775. Furnish tape with a minimum diameter #12 AWG HDPE insulated copper clad steel tracer wire. Provide certified data verifying compliance with these requirements.

726.01

On page 854, **Revise** the first paragraph as follows.

726.01 Barrier Reflectors. Furnish concrete barrier, cable barrier, retaining wall, bridge parapet, bridge rail or guardrail blockout reflector body housings of the following Type:

726.01

On page 855, **Add** the following paragraph after the eleventh paragraph.

Type 6, Cable Barrier Reflector. Furnish nylon, or polycarbonate plastic cable barrier reflectors. Products will have a minimum of 22.5 square inches of Type G, H, J, or Reboundable reflective sheeting visible to drivers traveling in both directions. Products will either be attached to the cable or ground mounted. Ground mounted products will meet the requirements of 720.03. Use products that are structurally reinforced to withstand the force of thrown plowed snow. New products will be tested by the Department for a minimum of one winter season before approval.

730.14

On page 858, **Replace** the entire section with the following:

730.14 Aluminum Castings. Furnish certified material according to Supplement 1092 or 1093.

A. Furnish sand castings according to ASTM B 26/B 26M, 356-T6 or T7.

B. Furnish self-aligning aluminum extrusheet sign mounting clips with manufacturer identification mark conspicuously incorporated in relief on the top surface of the casting, and in accordance with Supplemental Specification 992.

C. Furnish permanent mold castings according to ASTM B 108, 356-T6 or T7.

730.24

On page 860, **Add** the following section after section 730.23:

730.24 Digital Printing. Fabricate digitally printed signs using opaque and transparent color inks along with a clear UV overlaminate protectant film applied to the entire sign surface, sticker surface, or both that the manufacturer of the reflective sheeting guarantees according to Supplement 1049. Temporary work zone signs with black ink only do not require protective film. Ensure digitally printed colors meet the applicable daytime and nighttime color requirements of ASTM D4956 "Standard Specification for Retroreflective Sheeting for Traffic Control."

Sign fabricators using digital printing methods to produce regulated traffic signs must be certified by the manufacturer of the reflective sheeting whose materials are used to produce the delivered signs. Certified sign fabricators must undergo an audit process by the manufacturer of the reflective sheeting to ensure they have the proper training, equipment, color calibrations, manufacturing

capabilities, manufacturing application processes and the materials required to fulfill the sheeting manufacturer's warranty obligations. Sign fabricators must recertify annually with the manufacturer of the reflective sheeting or utilize a 3rd party certifier approved by the manufacturer of the reflective sheeting. ODOT may require proof of Sign Fabricator Certification with the execution of a purchase order (P.O.) or construction contract for signs.

731.06

On page 861, **Revise** the first paragraph to the following:

731.06 Sign Flasher Assembly. Furnish beacons consisting of single traffic signal sections with 8 or 12-inch (200 or 300 mm) yellow lenses. Ensure that the flasher control unit flashes the beacons at a rate for each beacon of between 50 to 60 times per minute with the light period from one-half to two-thirds of the total cycle. Furnish flasher control units that have all solid state components and that meet NEMA TS-2. House control units within a weatherproof corrosion-resistant enclosure with a lockable door. Include the LED lamps.

731.07

On page 861, **Revise** the first paragraph to the following:

731.07 School Speed Limit Sign Assembly. Furnish yellow beacons that are 8 inches (200 mm) or 12 inches (300 mm). Ensure that the flashers flash the beacons alternately at a rate for each beacon of 50 to 60 times per minute with the light period from one-half to two-thirds of the total cycle. Furnish flashers that have all solid state components and that meet NEMA TS-2. Ensure that the backing members with hardware are compatible with the method of support.

732.01

On page 862, **Replace** the first paragraph with the following:

732.01 Vehicular Signal Heads, Conventional. Ensure that vehicular traffic signal heads conform to the ITE "Vehicle Traffic Control Signal Heads" standard. In conformance with the above standard, provide signal heads that are of cast nonferrous corrosion resistant metal. For span mounted and non-tethered and free swinging installations, and for span mounted with tether and backplates or rigid mounted, use polycarbonate plastic heads with coloring obtained through colored plastic and not painted.

732.01

On page 862, **Replace** the third paragraph with the following:

Furnish signal heads with required mounting hardware. Furnish signal face orientation to traffic by serrated rings or other devices on housing sections and mounting hardware. Permit adjustment in increments not greater than 5 degrees of rotation and not affected by wind gusts when locked. Furnish galvanized steel or aluminum spacers and drop pipes 1 1/2 inches (38 mm) nominal pipe size (1.90 inch (48 mm) actual diameter). Ensure that disconnect hangers have at least twelve terminals unless a greater number is required. Tethered heads shall use 3/4-inch unpainted cast aluminum span wire clamps and cable entrance adapters with integral tri-studs (no tri-stud inserts), stainless steel hardware, and a single steel-reinforced mounting hole. Free-swinging heads shall use cast iron span wire clamps and cable entrance adapters with tri-studs. Tri-studs shall be secured to the head using stainless steel nylon-insert or distorted thread locknuts. A neoprene gasket placed under the clamp washer in the top signal section shall effectively seal the entrance adapter on the signal to make a waterproof connection and shall have a minimum thickness of 3/32 inch. Provide cutaway visors, unless specified otherwise, with all heads, and the inside surface of the visors shall have a finish of flat black. All other exterior surfaces of the signal head and hardware shall have a finish of Federal Yellow or Gloss Black to

closely agree with Federal Standard 595, Color 13655 or Color 17038. The coating system used shall be durable, uniform, and weather resistant.

732.01

On page 863, **Replace** the first full paragraph with the following:

For polycarbonate signal heads, ensure a minimum wall thickness of 0.11 in (2.79 mm).

732.04.A.1.j.

On page 865, **Replace** the last sentence with the following:

The optical assembly shall be used for all ball and arrow modules and shall be optional on ~~arrow and~~ pedestrian modules.

732.06

On page 869, **Replace** the last sentence of the second paragraph with the following:

Furnish housing with manufacturers applied external surfaces black Color 17038 or yellow Color 13655, Federal Standard 595, unless specified otherwise in the Plans.

732.06

On page 869, **Replace** the third paragraph with the following:

The pushbutton shall be a minimum of 2 inches across in at least one dimension. The force required to activate the pushbutton shall be no greater than 3.5 pounds (15.5N) and operate with a closed fist. There shall be a visible and audible indicator that the button press has occurred.

732.06

On page 869, **Add** the following section after the fourth paragraph.

A. Accessible Pedestrian Pushbutton. Use a pushbutton with a tactile arrow with high visual contrast, a continuous locator tone and a speech walk message for the Walking Person indication, and a speech pushbutton information message. Ensure all elements of the pushbutton are programmable and include all equipment necessary to program the pushbutton. Ensure the sign included with the pushbutton is the R10-3e.

732.06

On page 869, **Revert** the fourth paragraph to the following:

Furnish materials according to the Department's TAP list.

732.07.A.

Beginning on page 869, **Delete** the entire section.

~~**A. NEMA TS-1.** Ensure that the loop detector units comply with the requirements of NEMA TS-1, section 15, with the following modifications. Furnish shelf mounted loop detector units that are powered from 120 volts. Use solid state isolated output units for all controller applications where directly connected to a solid state digital controller unit. Ensure that the conductors in the cable harness for loop input pins are twisted three to five times per 1 foot (300 mm).~~

~~Ensure that the electrical connections for four-channel shelf-mounted units either are the 19-pin MS connector, as required by the foregoing specification, or consist of four connectors of the type required for single-channel shelf-mounted detector units.~~

~~If specified, design detector unit electrical connection plugs or wiring harness such that any multi-channel shelf mounted detector unit may be readily replaced with single channel detector units. Accomplish this by furnishing only units with the connector type required for single-channel shelf-mounted detector units, or by wiring the controller back panel to single-channel harnesses which are,~~

~~in turn, plug connected to an adapter harness which is mated to the multi channel connector of the detector unit.~~

~~Furnish loop detector unit with an LED or LCD display indication of call strength (ΔL/L or equivalent). This display shall be a bar graph or numerical display with at least eight (8) discrete levels indicated.~~

~~Furnish materials according to the Department's TAP List.~~

732.08

On page 870, **Delete** the entire section.

732.11

On page 871, **Replace** the second sentence in the first paragraph with the following:

Furnish tubes that are circular or regular polygons with twelve or more sides.

732.11

On page 871, **Replace** the sixth sentence of the first paragraph with the following:

The Pole Identification Tag shall be clearly and deeply stamped with the ODOT Standard Construction Drawing Number, Design Number, and the fabrication date of the pole (e.g., TC-81.22, DES. 12, 05-12) in characters with a minimum height of 3/8 in.

732.12

On page 872, **Replace** the fourth sentence of the first paragraph with the following:

The Pole Identification Tag shall be clearly and deeply stamped with the ODOT Standard Construction Drawing Number, Design Number, and the fabrication date of the pole (e.g., TC-81.22, DES. 12, 05-12) in characters with a minimum height of 3/8 in.

732.21

On page 875, **Revise** the second paragraph to the following:

Furnish materials according to the Department's QPL.

732.22

On page 875, **Revise** the first sentence to the following:

732.22 Backplates. Furnish louvered backplates constructed of wrought sheet aluminum, according to ASTM B 209 (B 209M), 6061-T6, 0.050 inch (1.3 mm) minimum thickness.

732.22

On page 875, **Replace** the tenth sentence with the following:

Reflective sheeting shall be Type J, ASTM D4956 Type XI.

733.01

On page 875, **Delete** the second definition.

~~**"NEMA TS-1" and "Type TS-1"** refers to equipment manufactured in conformance with the National Electrical Manufacturers Association (NEMA) Standards Publication No. TS-1.~~

733.01

On page 875, **Add** the following as the first paragraph:

"ATC" refers to equipment manufactured in conformance with the Advanced Transportation Controller Standard, a joint standard of AASHTO, ITE, and NEMA.

733.02

On page 876, **Delete** the entire section.

733.03

On page 879, **Delete** the following from the second paragraph:

Supply two through four phase controller operation with a minimum twelve position backpanel, configured for four pedestrian movements and four overlaps, with a ~~twelve channel NEMA TS-1 conflict monitor or~~ NEMA TS-2 malfunction management unit.

733.03

On page 879, **Delete** the following from the fourth paragraph:

For signal phasing configurations that require a larger capacity backpanel or conflict monitor, supply a 16 position backpanel with a ~~16 channel NEMA TS-1 conflict monitor or~~ NEMA TS-2 malfunction management unit.

733.03.15.

On page 880, **Add** the following paragraph after number 15:

Furnish 60-month warranties or the manufacturers' standard warranty, whichever is greater for the following equipment:

a. ATC/NEMA Cabinet & Equipment
   (1) Bus Interface Units
   (2) Malfunction Management Units

b. ATC/CalTrans Cabinet & Equipment
   (1) Model 2010/2018 Conflict Monitor Units

Ensure that the warranty period begins on the date of shipment to the project. Ensure that each unit has a permanent label or stamp indicating the date of shipment. Label shall indicate the equipment vendor name and or logo.

733.03.A.

Beginning on page 880, **Delete** the entire section.

~~**A. Type TS-1.**~~

~~**1. Cabinets.** Furnish a cabinet size that provides ample space for housing the controller unit and all associated electrical devices furnished with it, together with any other auxiliary devices that are specified. Furnish a cabinet with sufficient shelf space to accommodate all existing, proposed, and designated future equipment. Ensure that the space provided accommodates the appropriate controller unit frame as designated in NEMA TS-1, Section 14.~~

~~Construct the cabinets of cast aluminum or sheet aluminum, drawn or formed, with aluminum support and stiffening of members provided as necessary. Ensure that the exterior is smooth with no sharp edges. Weld all joints. Ensure that the cabinet is rigid and is designed to support all components. Ensure that the application of the following loads do not result in breakage, deformation, or loss of weatherproof qualities: a 100-pound (445 N) load applied to any 1-inch (25 mm) square surface of the cabinet or door (open or closed), in any direction; or a 300-pound (1.3 kN) load applied vertically downward to any 4-inch (100 mm) square of the top surface or to the top edge of the closed and latched door.~~

~~Provide cabinet exterior surfaces of bare aluminum. When the plans specify a cabinet color, prime and finish all cabinet exteriors with two coats of high grade enamel paint of the specified color. Ensure that the cabinet interior surfaces are the same as the exterior, or may be painted flat white.~~

Ensure that the cabinet contains at least one rain-tight louvered vent equipped with a replaceable filter. Install vents to allow for the release of excessive heat and any explosive gases that might enter the cabinet.

Ensure that the cabinets are functional in design and have a door in the front providing access to substantially the full interior area. Attach a gasket of elastomeric material to the cabinet or door to form a weatherproof seal. Furnish door hinge pins of stainless steel or equivalent corrosion resistant material. Furnish a door stop to retain the door in at least a 90 degree open position.

Include a small, hinged, and gasketed door-in-door (police door) on the outside of the main controller door. Ensure that the door-in-door does not allow entrance to the controller mechanism nor to exposed electrical terminals, but provides access to a small switch panel and compartment (police panel).

Fit the cabinet with the necessary provisions for mounting, with a bottom conduit connection provided for pole-mounted cabinets. Furnish suitable hardware and equipment for each cabinet mounting method, including bolts for drilled and tapped holes on metal supports, pole attachment clamps, pedestal slipfitter, and anchor bolts and conduit ells for installation in concrete foundations. Furnish steel anchor bolts that are galvanized at least 1 inch (25 mm) beyond the threads. Certified cabinet anchor bolts are not required.

Directly place all equipment designed for shelf mounting on a shelf except for loop detector units (amplifiers) and similar devices designed for stacking on each other. Arrange components on shelves and devices on the door so that a 1-inch (25 mm) minimum space separates them when the door is shut. Ensure that plugs, wires, controls, or similar items do not compromise this space.

Reserve a minimum 4-inch (100 mm) clear area on the bottom of the cabinet for the routing of cables. Do not locate panel mounted equipment in the bottom 6 inches (150 mm) of the cabinet. Do not locate shelves or components within 6 inches (150 mm) of the bottom of foundation mounted cabinets.

Arrange all equipment for easy withdrawal and replacement, without the necessity of disturbing adjacent equipment. Permanently locate devices within the cabinet to allow free circulation of air and that do not restrict air flow from fan ducts or vents.

Ensure that the auxiliary equipment operates within a weatherproof cabinet at ambient temperatures between -30 and 165 °F (-34 and 74 °C).

When terminals and panel mounted devices with exposed electrical contact points are located next to shelf mounted equipment, provide spacers, shelf lips, or other means to assure that component units cannot be accidentally moved into contact with any exposed electrical terminal points.

Ensure that load switches, relays, flashers, fuses, switches, terminal blocks, and other equipment mounted or plugged into the back or side panels are readily accessible. Ensure that switches, controls, and indicator lights are visible and easily operable without moving the components from their normal shelf positions.

Furnish an aluminum shelf with integral storage compartment in the space immediately below the controller. Ensure the storage compartment has telescoping drawer guides for full extension. Ensure the compartment top has a non-slip plastic laminate attached.

Furnish LED strip lighting for internal illumination.

Furnish materials according to the Department's TAP List.

2. Accessory Equipment

a. Ventilating Fan. Equip all cabinets with a forced air ventilating fan. Furnish a fan that provides a capacity of at least 100 cubic feet (2.8 m^3) per minute. Furnish a fan that is thermostatically controlled and adjusted to start at cabinet temperatures above 120 °F (49 °C) and to stop when the temperature has dropped below 100 °F (38 °C).

b. Load Switches. Furnish all cabinets with solid state, triple signal load switches complying with NEMA TS-1, Section 5. Additionally, ensure that all load switches have both input and output indicators.

c. Conflict Monitor. Furnish all cabinets with a separate solid-state conflict monitor device. Ensure that the cabinet wiring, in the event of monitor disconnection, transfers the signals to a flashing condition. Furnish conflict monitors that comply with NEMA TS-1, Section 6. Additionally, ensure that all conflict monitors are capable of causing the signals to flash as a result of the following events:

(1) All red lamps associated with a load switch are burned out;

(2) Within one second when red and green, or yellow and green color pairings are displayed on the same phase;

(3) The absence of a minimum yellow interval.

Ensure that the monitor indicates the exact load switch output channel upon which the failure event occurred. Furnish conflict monitors that are capable of storing a minimum of nine fault events (event logging feature). Furnish a monitor that utilizes a LCD display and has a RS-232 port for connection to a laptop computer. Furnish software and connector cables to diagnose the conflict monitor.

d. Flashers. Furnish solid-state flashers that comply with NEMA TS-1, Section 8. When signals have a normal stop-and-go sequence that includes flashing, either ensure that the controller unit generates that flashing display or provide flashers. For this purpose, provide separate flashers from those provided for emergency back-up. Furnish flashers that are designed with two circuits of at least 10 amperes each.

Equip each controller cabinet with terminals that are wired so that, by an interchange of jumpers, the flashing operation is arranged to display either flashing yellow or flashing red on the vehicular signals.

e. Relays. Ensure that the relays required for proper operation of the specified equipment are furnished and completely wired. Furnish relays that are enclosed, readily replaceable, and designed for one-million operations without failure or need for adjustment.

f. Surge Protection Devices. Furnish surge protection on incoming power lines, interconnect lines, and detector leads.

The primary surge protection device (SPD) shall be an EDCO SHA-1250 or approved equal. A plug-in base shall be used to hold the device. All wiring connections shall be made to the base, and appropriate cabinet clearances maintained, to allow the SPD module to be relaced by hand without the use of tools.

Furnish loop detector lead-in cable protection that consists of devices installed in each detector circuit where the lead-in connects to the terminal block. House each device in a case that consists of two stages; a 3-electrode gas tube arrestor and a semiconductor circuit. Ensure that the arrestor shunts to ground a common mode transient with a 1,000 ampere peak and an 8/20 microsecond wave shape, ionizing at 400 volts within 100 nanoseconds when subjected to a 1,000 volt per microsecond transient. Furnish a semiconductor circuit that clamps a differential transient to 30 volts within 40 nanoseconds of the appearance of the transient, and a common mode transient to 30 volts within 500 nanoseconds of the ionization of the gas tube arrestor. Ensure that the second stage is able to withstand a peak current of 13 amperes. Furnish a device that has impedance characteristics compatible with the detector unit so as not to cause false calls or increase the loop impedance above the sensitivity of the detector unit.

Furnish pedestrian pushbutton inputs with the same protection as specified for the loop detector lead-in cables.

Protect interconnect cable against transients by devices across each conductor of the cable and ground. The devices may be either 2 or 3-terminal devices. If 3-terminal devices are used, connect two

conductors and ground to the same device. Furnish a protection device that consists of a gas tube arrestor with a maximum ionization voltage of 1000 volts on a 10,000 volt per microsecond transient or a maximum ionization voltage of 950 volts on a 3000 volt per microsecond transient. Ensure that the maximum time from beginning of the transient to ionization is 1.1 microseconds on a 10,000 volt per microsecond transient. Ensure that the device is not ionized by normal voltage variations on a 120-volt AC line. Furnish a device that is able to withstand a 10,000 ampere peak with an 8/20 microsecond waveshape.

g. Main Power Breaker. Furnish an incoming AC+ power line that is controlled by a main circuit breaker rated at 240 volts and an auxiliary breaker, with capacity and wiring as specified in NEMA TS-1, Section 10.3.2.2 and Figure 10-4.

If a power service disconnect switch is located before the controller cabinet, the neutral (AC-) and the grounding bar in the controller cabinet shall not be connected together as shown in NEMA TS-1, Figure 10-4.

h. Radio Interference Filter. Furnish an incoming AC+ power line that contains a radio frequency interference (RFI) filter installed between the main circuit breaker and the solid state equipment. Also, provide RFI filtering for the load switches and flasher, unless the equipment furnished provides signal and flasher circuits switching at the zero voltage point of the power line sinusoid wave form.

i. Convenience Outlet and Light. Wire a convenience outlet into the cabinet for use by electrical maintenance equipment. Ensure that the outlet contains at least one standard duplex three-wire NEMA 5-15 receptacle of the ground-fault circuit-interrupting (GFCI) type. Wire a second non-GFCI convenience outlet, not fed thru the UPS system (if used). Furnish and mount a white LED lamp in the upper portion of the cabinet. Furnish a door switch to control the convenience light.

j. Manual Control and Pushbutton. When required by the plans, provide intersection controller units with means for substituting manual operation of interval timing for automatic interval timing. Ensure that manual operation provides the same interval sequence as when the controller unit is operating automatically.

Obtain manual interval timing by a momentary pushbutton contact switch mounted on a 5-foot (1.5 m) minimum flexible weatherproof extension cord. Store that switch and cord behind the small door-in-door.

k. Switches. Furnish completely wired switches that are required for proper operation of specified equipment. Clearly and permanently label switches as to function and setting position, and ensure that they are accessible without the necessity of moving components.

(1) Signal Shutdown Switch. Furnish a cabinet with a signal shutdown switch for turning off the power to the signals at the intersection. Ensure that this switch only affects the power to the signals, and allows the controller to continue in operation. Locate the switch in the panel behind the small door-in-door (police door).

(2) Auto/Flash Switch. Furnish a cabinet with a flash control switch for activating the flashing of vehicular signals in a preselected emergency flash display. Ensure that the operation of the flash control switch causes a flashing display even under conditions of controller unit malfunction or of its removal from the cabinet. Ensure that the operation of the switch overrides any operation commands from a local or remote time switch. Locate the switch in the panel behind the small door-in-door (police door).

Program the transfer to and from flashing operation, when called remotely or by a local time switch, to occur only at points in the cycle allowed by the OMUTCD.

(3) Automatic/Manual Transfer Switch. Furnish a cabinet with an automatic/manual transfer switch. In the automatic position, ensure that the controller unit automatically sequences the

signal head displays. In the manual position, ensure that the signal phase or interval sequencing occurs only upon manual activation of the manual control pushbutton. Locate the switch in the door-in-door (police door). Ensure that it is unnecessary, when switching from manual to automatic operation, or vice versa, to do so at any certain time or to make any time adjustments.

(4) Run/Stop-Time Switch. Furnish a cabinet with a run/stop-time switch that activates the controller stop-time feature when in the "stop-time" position. Locate the run/stop-time switch on a switch panel in the cabinet.

(5) Controller Shutdown Switch. Furnish a cabinet with a controller shutdown switch that cuts off power to the controller unit, conflict monitor, and detector units. Ensure that power is not cut off to those components required to maintain flashing operation. Locate the controller shutdown switch on a switch panel in the cabinet.

(6) Coordinated/Free Switch. Furnish controllers operated in a coordinated system with a coordinated/free switch. Ensure that this switch allows the choice of operating the controller under the supervision of a coordination device or operating the controller independently of coordination control. Locate the coordinated/free switch on a switch panel in the cabinet.

(7) Detector Test Switches. Furnish momentary contact switches that will enter a vehicular or pedestrian call for any actuated phase. Furnish a switch for each actuated phase vehicular and pedestrian detection input. Conveniently group and label the switches.

l. Terminal Blocks. Furnish cabinets that include terminal blocks mounted on panels on the walls of the cabinet. Ensure that the blocks are not obstructed by shelf-mounted devices. Furnish sufficient terminal sets for each individual harness wire as well as for contacts of signal load switches, flasher transfer relays, flasher, and other components. Also, provide separate terminal sets for field wiring connections, including power, signal, interconnection, and detector lead-in cables. Group terminal sets to separate higher voltage (120 VAC) from lower voltage, and arrange them into logical groups. Protect terminal blocks from accidental contact during the installation and removal of shelf-mounted equipment. Locate the blocks no closer than 4 inches (100 mm) from the bottom of pole and pedestal mounted cabinets, and no closer than 6 inches (150 mm) from the bottom of foundation mounted cabinets.

Ensure that the terminal points are UL listed as suitable to carry the rated loading. Ensure that the capacity and size of the terminals are as specified in NEMA TS-1, Section 10.2.5. Ensure that the terminal points for signal field wiring for each circuit accommodates at least four 12 AWG conductors with spade type terminals.

Furnish terminal points for incoming power wiring that accepts either spade terminals or bare stranded wire and are suitable for either aluminum or copper conductors.

Space terminal sets for easy wiring. Furnish at least six reserve terminal sets for controllers. Harnesses may terminate on the back of terminal blocks using through-panel terminals. Clearly mark terminal sets for ready identification including through-panel terminals that are identified on both sides. Ensure that the contact between adjacent terminal points are made by bus bar, or by wire jumpers having spade type terminals securely attached to each end.

m. Terminal Buses. Furnish a cabinet with supply terminal buses fed from the line side of the incoming 120 VAC power line, after the phase wire has passed through the main power switch. Ensure that the requirements for use of radio interference filters are according to Item 8 of this Section, with the buses supplying load switches and with flashers being filtered when required. Ensure that a signal bus relay controls power to the bus supplying power for the signal load switches. . The following overrides NEMA requirements for signal bus relays. A solid-state relay shall be used for the signal bus relay. The signal bus relay shall maintain output equal to or above the rating of the cabinet main overcurrent

protection device over the NEMA TS-2 Environmental Operating Range of -50 to +185 degrees F (-45 to +85 degrees C).

Furnish a common terminal bus for the connection of the neutral wire of the incoming 120 VAC power line. Ensure that the common bus has sufficient terminal points to accommodate all potential cabinet wiring as well as field wiring. Use a separate common terminal, insulated from the panel, for the interconnect common.

Furnish bus terminal points that comply with Item 12 of this Section for conductor accommodation, attachment and identification.

n. Grounding System/Bus Bars. Furnish a cabinet that includes a grounding system as specified in NEMA TS-1, Section 10.3.2.1 with an adequate number (minimum of three) of ground terminal points.

o. Wiring. Neatly organize and route the harnesses and wiring bundles to individual terminals. Ensure that the harness provides a wire for each pin or contact of the device. Connect each wire to a marked terminal position. Use labeled spade type terminals or plug connections on all harness wiring. Group and lash or restrain wire bundles in such a manner that they will not interfere with the access to components, terminal blocks or buses, or the legibility of terminal identification. Ensure that the harnesses are of sufficient length to reach any point within the cabinet. Ensure that the cables and harness bundles are easily traced through the cabinet to their terminations. Route all wiring terminated on printed circuit boards (as commonly done for BIU backpanel connectors) at right angles to the pin array; no wires shall pass over the connector pins.

Wire the cabinet so that controller pin connections associated with a given phase number matches the phase number assigned to the specified traffic movement as shown on the plans.

Furnish all wiring with stranded conductors. Ensure that the wiring is adequate for the voltage and load that represents the ultimate load of the devices connected. Ensure that the ampacity rating of the wires are as specified in NEMA TS-1, Section 10.3.3.1. Ensure that the wiring is color coded as follows:

(1) Solid white, AC common.

(2) Solid green or green with yellow stripes, equipment ground.

(3) Solid black, AC line side power (AC+).

p. Loop Detector Units. Furnish loop detector units that comply with the requirements of NEMA TS-1, Section 15, with the following modifications:

(1) Furnish loop detector units that are shelf mounted and powered from 120 volts.

(2) Ensure that the unit uses solid-state isolated output devices.

(3) Furnish conductors in the cable harness for loop input pins that are twisted three to five times per foot (300 mm).

(4) Furnish detector unit electrical connection plugs or wiring harness that are designed such that any multi-channel shelf mounted detector unit is readily replaced with single channel detector units. Furnish only units with the connector type required for single channel shelf mounted detector units, or by wiring the controller back panel to single channel wiring harnesses which are, in turn, plug connected to an adapter harness that is mated to the multi-channel connector of the detector unit.

(5) When shown on the plans, supply delay and extension timing capability on the detector unit; otherwise, the controller unit software requirements of 733.02 will provide these features.

(6) Ensure that the harness provides a wire for each pin or contact of the device.

~~(7) Furnish loop detector unit with an LED or LCD display indication of call strength (ΔL/L or equivalent). This display shall be a bar graph or numerical display with at least eight (8) discrete levels indicated.~~

~~If vehicle detector types other than "loop" detectors are required by the plans, provide these detectors by separate bid item.~~

~~Furnish TS-1 cabinets according to the Department's TAP List.~~

733.03.B.1.h.

On page 888, **Replace** the first paragraph with the following.

Section 7.3, unless otherwise specified in the plans, provide a Size 5 cabinet for pole mounted cabinets, Size 7 for ground mounted cabinets. Supply larger cabinets if required to house the equipment to meet the plan requirements; ~~such as master controllers~~ such as additional ITS equipment, preemption devices, 16 position backpanels or special detection units.

733.03.B.2.

On page 888, **Replace** the entire section with the following:

2. Furnish loop detector and pedestrian inputs that have lightning/surge protection ~~as specified in 733.03.A.2.f.~~.

Furnish loop detector lead-in cable protection that consists of devices installed in each detector circuit where the lead-in connects to the terminal block. House each device in a case that consists of two stages; a 3-electrode gas tube arrestor and a semiconductor circuit. Ensure that the arrestor shunts to ground a common mode transient with a 1,000 ampere peak and an 8/20 microsecond wave-shape, ionizing at 400 volts within 100 nanoseconds when subjected to a 1,000 volt per microsecond transient. Furnish a semiconductor circuit that clamps a differential transient to 30 volts within 40 nanoseconds of the appearance of the transient, and a common mode transient to 30 volts within 500 nanoseconds of the ionization of the gas tube arrestor. Ensure that the second stage is able to withstand a peak current of 13 amperes. Furnish a device that has impedance characteristics compatible with the detector unit so as not to cause false calls or increase the loop impedance above the sensitivity of the detector unit.

Furnish pedestrian pushbutton inputs with the same protection as specified for the loop detector lead-in cables.

733.03.B.6.

On page 889, **Revise** the first paragraph to the following.

6. The primary surge protection device (SPD) shall be an EDCO SHA-1250 or approved equal. A plug-in base shall be used to hold the device. All wiring connections shall be made to the base, and appropriate cabinet clearances maintained, to allow the SPD module to be replaced by hand without the use of tools. Cabinet power distribution shall conform to Figure 5-4, NEMA TS-2 2003 v02.06. In addition, ~~locates a non GFCI NEMA 5-15 utility outlet on the right side power panel.~~ install three (3) non GFCI NEMA 5-15 utility outlets on the right side of the power panel for a total of six (6) receptacles. These outlets shall be powered independently of the UPS by direct connection to incoming utility power through a 15-amp circuit breaker labeled "UTILITY OUTLET."

733.03.B.8.

On page 889, **Delete** the entire section:

~~8. Include datakey module. Provide a datakey with each controller, taped securely to the top of the controller chassis.~~

733.03.C.2

On page 890, **Add** the following after c.

d. Use 332L ground mount cabinets that have an auxiliary output file. Ensure the auxiliary output file is in accordance with the Caltrans TEES 2009, Section 6.4.5.3 Output File #2 and come with two flasher blocks and six load switches. Ensure all channels from the output file are monitored by the CMU.

733.03.C.6.g.1

On page 899, **Revise** the first paragraph to the following.

(1) Install an RS232 port for laptop communications on the front panel of the Monitor. If specified in the plans, an ~~IP~~ ethernet port shall be used in place of RS232.

733.03.D.

On page 900, **Delete** 733.03.D in its entirety.

733.03

On page 901, **Replace** "**E. Type 336L.**" with the following:

D. Type 336L.

733.05

On page 903, **Revise** the first sentence to the following:

733.05 Flasher Controller. Furnish solid-state flasher that complies with NEMA TS-2, ~~Section 8,~~ and have two circuits, each rated at 10 amperes.

733.05

On page 903, **Revise** the second sentence of the paragraph to the following:

Furnish a cabinet that conforms to applicable requirements of 733.03.~~A~~ B, except that the following items are not required: a small door-in-door (police door), shelves, and a fan.

733.06.B.1.

On page 903, **Replace** the first paragraph with the following.

1. Design. Furnish a solid state, digital microprocessor master controller design. Furnish a controller that uses menu driven prompts. If the master controller is used with Type 2070 controllers, provide software unless otherwise shown on the plans.

733.06

On page 903, **Delete** the entire section.

733.07.B.1

On page 905, **Revise** the sentence to the following:

1. Local intersection controller (see ~~733.02~~ Supplemental Specification 809.10.G)

733.07.C

On page 906, **Revise** the first sentence to the following:

Furnish controller units conforming to ~~733.02~~ Supplemental Specification 809.10.G for the type of controller shown on the plans.

733.09.A.

On page 907, **Replace** the second paragraph with the following:

Furnish a UPS compatible with all of the following traffic signal equipment; NEMA TS-2 controllers and cabinets, Model 332 & 336 cabinets, 2070 controller and electrical service pedestals.

733.09.C.

On page 909, **Add** the following paragraph after the fifth paragraph:

Furnish UPS battery according to the Department's TAP List.

733.09.D.

On page 909, in the first paragraph, **Replace** the first sentence with the following.

Furnish an enclosure mountable to a standard Model 332, NEMA TS-2 traffic signal cabinet and be constructed of natural unpainted aluminum.

733.10

On page 909, **Delete** the entire section.

~~**733.10 Centrally Controlled Arterial Traffic Signal System.** Furnish materials according to the Department's TAP List.~~

740.02

On page 910, **Replace** the third sentence in the first paragraph with the following:

Furnish Type 1 paint that will not deteriorate in storage, within one year after date of receipt, to the extent that it cannot be readily broken up with a paddle to a smooth uniform paint capable of easy application by spray. Furnish Type 1A paint that will not deteriorate in storage in accordance with the manufacturer's recommendation.

740.04.G

On page 913, **Replace** the first sentence of the section with the following:

Furnish yellow material containing a minimum of 5 percent by weight of primary yellow lead free pigment (measured according to ASTM D 126 or Department approved lab method).

740.08

On page 916, **Replace** the section in its entirety with the following:

740.08 Heat-Fused Preformed Thermoplastic Pavement Marking Material. Furnish heat-fused preformed thermoplastic pavement marking materials conforming to the following:

Material Type	Thickness	Pre-heat	Post-heat
Type A90	90 mil (2.29 mm)	Yes	Yes
Type B90	90 mil (2.29 mm)	No	Yes
Type A125	125 mil (3.18 mm)	Yes	Yes
Type B125	125 mil (3.18 mm)	No	Yes

Furnish heat-fused preformed thermoplastic pavement marking materials conforming to AASHTO M249 with the following the following requirements:

A. Pigments. Furnish white material with sufficient titanium dioxide pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. Furnish yellow material

with sufficient pigment to meet FHWA Docket No. FHWA-99-6190 Table 5 and Table 6 as revised and corrected. The yellow pigments must be organic and must be heavy-metal free.

B. Heating indicators. Furnish the material with the top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. The closing of these indents during application, shall act as a visual cue that the material has reached a molten state allowing for satisfactory adhesion and proper bead embedment, and as a post-application visual cue that the application procedures have been followed.

C. Skid Resistance. Furnish the material with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E 303.

D. Environmental Resistance. Furnish the material that must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

Ensure that the material contains reflective glass beads, 740.09 Type E. Prequalify materials according to Supplement 1047. Furnish materials according to the Department's Approved List.

740.09.E

On page 918, **Add** the following new section after section 740.09.D. Type D.:

E. Type E. Furnish heat-fused preformed plastic pavement marking materials that contain a minimum of thirty percent (30%) intermixed graded glass beads by weight and factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq. ft.

Furnish factory applied coated surface beads with the following specifications:

1) Minimum 80% rounds
2) Minimum refractive index of 1.50

Furnish intermixed graded glass beads and factory applied coated surface beads that conform to Type 1 and/or Type 3 AASHTO M247 as recommended by the manufacturer.

Use materials certified according to Supplement 1089.

740.10.A

On page 918, **Revise** the entire section to the following:

A. Composition.

	White	**Yellow**
Binder	25% Min.	25% Min.
TiO_2 Pigment (Type II Rutile)	10% Min.	
Lead-Free Pigment (Yellow 83)	N/A	*
Inter mixed Glass Beads	30% Min. (by weight)	30% Min. (by weight)
Filler	35% Max.	42% Max.

*amount of lead-free pigment is at the discretion of the manufacturer, as long as all other compositional requirements are met.

740.10.B.

On page 918, **Revise** the second sentence of the first paragraph to the following:

Ensure at least one third of the binder composition is maleic modified glycerol ester of rosin and is no less than 8 percent by weight of the entire material formulation.

740.10.C.

On page 919, **Revise** the second paragraph to the following:

Use lead-free Pigment Yellow 83 produced to meet the requirements of AMS-STD-595A Color No. 13538.

740.10.E.

On page 919, **Revise** the second paragraph to the following:

Visually match yellow spray thermoplastic with AMS-STD-595A No. 13538. Ensure daytime reflectance (Y) is greater than 45.

740.10.J.

On page 919, **Revise** the third sentence of the first paragraph to the following:

Test sample with a male indenter 5/8 inch (15.875 mm) and no female Die, at room temperature.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 821
ARROW BOARD

April 20, 2012

821.01 Description
821.02 Materials
821.03 Use and Operation
821.04 Basis of Payment

821.01 Description. This work consists of furnishing, installing, maintaining and removing arrow boards.

821.02 Materials. Furnish materials conforming to:

Arrow Board.…….921.02

821.03 Use and Operation. Locate arrow boards as shown in the plans or as directed by the Engineer. Supply all lubricants and parts necessary to obtain continuous operation and provide all service. Inspect the operation of the unit daily including weekends and holidays. Arrange with the Engineer an acceptable method of obtaining service for a malfunctioning panel within 2 hours of a reported malfunction.

Limit use of Type A arrow boards to low-speed 20 - 35 mph urban streets. Use of Type B arrow boards is appropriate for intermediate-speed 40 – 50 mph facilities and for maintenance or mobile operation on high-speed roadways. All arrow boards used in stationary traffic control operation on high-speed 55 mph or greater, high-volume roadways shall be Type C.

Fully charge battery and solar/battery units when first set up. Verify daily that the unit is operating satisfactorily and the remaining battery charge is sufficient for at least 2 more days.

An arrow board in the arrow mode shall be used only for stationary or moving lane closures on multi-lane roadways. For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily closing one lane on a two-lane, two-way roadway, an arrow board shall be used only in the caution mode. Arrow boards shall not be used to laterally shift traffic.

Lock the control cabinet when left unattended.

Type A and B arrow boards used in mobile operations may be powered by the vehicle’s electrical system, but shall not be left unattended when so powered. Caution is advised to prevent the vehicle’s electrical system from running down while the arrow board is

being operated during frequent stops, as a run-down of the battery would leave the arrow board to be inoperative.

When an arrow board is not being used, it should be removed; if not removed, it should be shielded; or if the previous two options are not feasible, it should be delineated with retroreflective temporary traffic control devices.

821.04 Basis of Payment. The lump sum bid for 614 Maintaining Traffic includes the cost of arrow boards.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 832
TEMPORARY SEDIMENT AND EROSION CONTROL

October 19, 2018

832.01 Description
832.02 Definitions
832.03 SCD References
832.04 Requirements and Provisions
832.05 Locate and Furnish BMP
832.06 Temporary Access Fills (Causeway and Access Fills).
832.07 Temporary Access Fills Construction
832.08 Maintenance
832.09 Storm Water Pollution Prevention Plan
832.10 SWPPP Acceptance
832.11 Inspections and SWPPP Updates
832.12 Compensation
832.13 Method of Measurement
832.14 Basis of Payment

832.01 Description. This work consists of locating, furnishing, installing, and maintaining temporary sediment and erosion control Best Management Practices (BMP) for earth disturbing activity areas, developing a Storm Water Pollution Prevention Plan (SWPPP), performing SWPPP Storm Water Pollution Prevention Inspections, filing a Co-Permittee form as required. Furnish a SWPPP if required prior to any earth disturbing activity. Furnish and install temporary sediment and erosion control BMPs in compliance with all National Pollutant Discharge Elimination System (NPDES) and surface water permits. Amend the SWPPP in accordance with the Ohio Environmental Protection Agency (Ohio EPA) General Construction Stormwater NPDES Permit. In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, State, or local agencies, adhere to the more restrictive laws, rules, or regulations.

832.02 Definitions

Alternative BMP. Temporary structural BMP recommended for use by the SWPPP Designer when traditional BMP listed in Appendix F are determined to be "not-appropriate" based on design considerations listed in 832.05. Alternative BMP selected by the SWPPP Designer must be compliant with the OEPA NPDES Permit and be accepted for use by the Engineer.

BMP. Temporary structural sediment and erosion control best management practices designed and installed by methods compliant with the Ohio EPA NPDES Permit (Appendix E of this specification Part III. G. 2.), by this specification and location shown on the SWPPP.

C&MS. Construction and Material Specifications of the Ohio Department of Transportation dated as shown on the plans.

CECI. Contractor's Erosion Control Inspector. Must have active CESSWI or CPESC certification.

CESSWI. Certified Erosion, Sediment, and Storm Water Inspector sponsored by the Soil and Water Conservation Society and International Erosion Control Association. Information on certified individuals is available at *www.cesswi.org*.

CPESC. Certified Professional in Erosion and Sediment Control as sponsored by the Soil and Water Conservation Society and International Erosion Control Association. Information on certified individuals is available at *www.cpesc.net*.

Co-Permittee. A requirement of OEPA NPDES Permit (Appendix E of this specification, Part I. F. Notice of Intent Requirements).

EDA. Earth Disturbing Activity is any activity that exposes bare ground or an erodible material to storm water, including any "Disturbance" as defined in OEPA NPDES Permit, Part VII, Definition H.

Contractor EDA. Any EDA that is <u>not</u> shown on the plans as part of the project. EDA not shown on the plans and occurring within the project limits is also Contractor EDA.

Project EDA. Any EDA that is shown on the plans as part of the project.

Total EDA. Combined Project EDA and Contractor EDA.

EPA. Environmental Protection Agency.

Isolated Wetland Permit. OEPA permit allowing the discharge of fill material into an isolated wetland.

NOI. Notice of Intent.

NOT. Notice of Termination.

NPDES. National Pollutant Discharge Elimination System.

OEPA. Ohio Environmental Protection Agency.

OEPA NPDES Permit. OEPA Storm Water Construction General Permit (OHC000005) Appendix E of this specification.

OES. Office of Environmental Services-ODOT.

OHWM. The line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas or defined in accordance with the most current version of 33 CFR 328.

Operator. As defined in OEPA NPDES Permit (Appendix E of this specification, Part VII. Definitions, Q.)

OWPCA. Ohio Water Pollution Control Act (Ohio Revised Code 6111.01 et seq.).

Post-Construction BMP. Permanent water quality or water quantity best management practices required by the EPAOEPA NPDES Permit.

PCN. Pre-Construction Notification for 404 permit.

SCD. Standard Construction Drawing.

SWPPP. Storm Water Pollution Prevention Plan.

SWPPP Designer. The Ohio licensed Professional Engineer that also maintains a current CPESC certification who developed the Storm Water Pollution Prevention Plan.

SWPPPTrack. Software subscription service version SWPPPTrack LTIS OH developed and provided by Storm Water Simplified Ltd. for use on construction projects that require coverage under the OEPA NPDES Permit.

USACE. United States Army Corps of Engineers.

404 Permit. USACE permit authorizing discharge of fill material into Waters of the US, per Section 404 of the Clean Water Act.

401 Water Quality Certification (401 WQC). OEPA permit authorizing discharge of fill material, per Section 401 of the Clean Water Act.

Waters of the United States. Defined in Code of Federal Regulations, 33 CFR Part 328.

832.03 SCD References. Construct the following features according to the SCDs as listed on the plan title sheet.

Construction Fence..... DM-4.3
Dikes..... DM-4.3
Filter Fabric Ditch Check DM-4.4
Inlet Protection..... DM-4.4
Perimeter Filter Fabric Fence DM-4.4
Rock Channel Protection Type C or D with/without Filter
..... DM-4.3/4.4
Sediment Basins and Dams DM-4.3
Slope Drains..... DM-4.3
Construction Entrance (Type 1 Driveway)..... BP 4.1

832.04 Requirements and Provisions. Furnish a SWPPP meeting all the requirements of this specification and that maintains compliance with OEPA NPDES Permit (See Appendix E), related rules, specifications, SCD, and permits. The Department will furnish the Contractor a copy of the NOI and the OEPA approval letter at or before the Pre-Construction meeting.

Locate, furnish, install, and maintain temporary sediment and erosion control Best Management Practices (BMP) that maintain compliance with the OEPA NPDES Permit, Clean Water Act (33 USC Section 1251 et seq.), the OWPCA, the 404 permit, the 401 WQC, the Isolated Wetland Permit, local government agency requirements, specifications, SCD, and other related rules and permits.

File a Co-Permittee form when the project requires a Notice of Intent (NOI) to the OEPA. Information about electronic filing of the Co-Permittee notice can be found at http://www.epa.state.oh.us/dsw/permits/gpfact#137794352-applying-for-coverage Submit a copy of the Contractor's OEPA Co-Permittee approval notice or a copy of the submitted application to the Engineer at or before the Pre-Construction meeting.

The following provisions survive the completion and/or termination of the contract.

Provision 1. If a governmental agency or a local governmental authority finds a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, full responsibility is borne by the Contractor to make all corrections.

Provision 2. If a governmental agency or a local governmental authority furnishes an assessment, damage judgment or finding, fine, penalty, or expense for a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor will reimburse the Department within 10 Calendar Days of the amount for any of the above. The Department may withhold the amount of money requested for the above from the Contractor's next pay estimate and deliver that sum to the governmental agency or local governmental authority issuing the assessment, damage judgment or finding, fine, penalty or expense.

Provision 3. The Contractor agrees to indemnify and hold harmless the Department, and will reimburse the Department for any assessments, damage judgment or finding, fine, penalty, or expense as a result of the failure of performing this portion of the Contract. The Department may withhold the amount of any assessments, damage judgment or finding, fine, penalty or expense from the Contractor's next pay estimate.

Provision 4. If a governmental agency or a local governmental authority furnishes a stop work order for any of the following: a violation of the above noted requirements; BMP are incomplete; SWPPP is incomplete; implementation of the SWPPP is not being performed correctly or completely, the Department will find the Contractor in default.

Provision 5. If the Department or any government regulatory agency finds a violation of the above noted requirements, or that the BMP are incomplete, or that the SWPPP is incomplete or that the implementation of the SWPPP is not being performed correctly or completely, the Contractor shall correct and mitigate the conditions within 48 hours of notification by the Department or regulatory agency. Failure to correct non-compliant site conditions may result in the Department suspending work for the entire project until the corrections are performed. Repeated non-compliance with the SWPPP or failure to regularly update the SWPPP as needed to match the site conditions may result in removal of the Contractor's Superintendent in accordance with C&MS 108.05.

EDA Requirements. Furnish appropriate BMP for all EDA. Unless otherwise indicated, BMP will be compensated provided that the BMP are designed, installed and maintained appropriately. For projects that do not require a SWPPP as indicated in the table below, furnish a written plan for acceptance by the Engineer that identifies the location, extent and purpose of the BMP proposed. Compensation will not be provided for the written plan.

An estimated amount is established in the proposal for BMP to be used for project EDA and estimated Contractor EDA as outlined below:

Scenarios for Routine Maintenance Projects (as identified on the Plan Title Sheet)			
Project EDA (acres)	Estimated Contractor EDA (acres) [1]		
	EDA = 0	0 < EDA < 1	1 ≤ EDA < 5
EDA = 0	A	B	C
0 < EDA < 5	B	B	C

Scenarios for Non-Routine Maintenance Projects			
Project EDA (acres)	Estimated Contractor EDA (acres) [1]		
	EDA = 0	0 < EDA < 1	EDA ≥ 1
EDA = 0	A	B	D
0 < EDA < 1	E	[2]	F
EDA ≥ 1	F	F	F

[1] If the actual Contractor EDA in the SWPPP exceeds the estimated Contractor EDA on the Title Sheet resulting in a Total EDA > 1 acre (0.4 ha), use Scenario D.

[2] If project EDA and estimated Contractor EDA are less than 1 acre (0.4 ha), use Scenario E. If Project EDA and Estimated Contractor EDA are greater than 1 acre (0.4 ha), use Scenario F. If the actual Contractor EDA exceeds the estimated Contractor EDA and results in the Total EDA exceeding 1 acre (0.4 ha), use Scenario D.

Scenario A:	No requirements for SWPPP, NOI and NOT. Furnish written to plan Engineer.
Scenario B:	Provide BMP for Contractor EDA. No SWPPP, NOI or NOT are required. BMP used for Contractor EDA will not be compensated. Furnish written plan to Engineer.
Scenario C:	Furnish a BMP, SWPPP, NOI, and NOT for Contractor EDA only. BMP used for Contractor EDA, SWPPP, NOI and NOT will not be compensated.
Scenario D:	Furnish a NOI, SWPPP with BMP, and a NOT for all EDA areas. The NOI, SWPPP, BMP, and the NOT will not be compensated.
Scenario E:	Furnish BMP for all EDA. No SWPPP, NOI or NOT are required. BMP used for the Project EDA will be compensated. Furnish written plan to Engineer.
Scenario F:	Furnish a SWPPP with BMP for all EDA areas and file a Co-Permittee form. The SWPPP and these BMP will be compensated. The Department will furnish a NOI and NOT.

832.05 Locate and Furnish BMP. Locate and furnish the BMP in accordance with the OEPA NPDES Permit requirements and the Accepted SWPPP.

The Contractor's SWPPP Designer is responsible for selecting appropriate BMP that are designed in compliance with the OEPA NPDES Permit. SWPPP Designers shall utilize BMP listed in Appendix F as the first option when selecting BMP. If the SWPPP designer determines that the BMP listed in Appendix F are not appropriate based on design limitations, constructability constraints or if the BMP may cause a safety hazard, the Department may accept other materials (Alternative BMP) recommended by the SWPPP Designer. Provide design criteria supporting the selection of Alternative BMP on the SWPPP. Utilize cost effective Alternative BMP that meet each location's design requirements.

All Alternative BMP must be evaluated through the Office of Materials Management New Product Development Standard Procedure 515-001(SP) Appendix 2 and be accepted by the Office of Construction Administration prior to being used on ODOT projects. The Department may reject any Alternative BMP determined to be inappropriate, cost excessive or not effective based on the opinion of ODOT's Office of Construction Administration.

ODOT's Office of Construction Administration maintains compensation rates for commonly used and accepted Alternative BMP. For all other Alternative BMP accepted by the Engineer, the Department will compensate the Contractor at agreed unit prices based on material cost, labor and equipment costs as outlined in C&MS 109.05 B.

Furnish filter fabric ditch checks, inlet protection, perimeter filter fabric fence, sediment basins and dams, dikes, slope drains, construction entrances, erosion control mat and rock channel protection materials as specified on the SCD.

Post-Construction BMP as defined in 832.02 are not temporary erosion control features. Construction requirements and compensation for Post-Construction BMP are detailed in the project plans. Provide protective measures that ensures sediment, debris and any contamination will not enter the Post-Construction BMP.

A. Sediment Controls. Install sediment controls immediately prior to earth disturbing activities. Ensure that ponding of water from sediment controls will not damage property or threaten human health or safety. All stormwater from disturbed areas is required to pass through a sediment control prior to being discharged from the project. Remove sediment controls when their tributary areas have been stabilized with at least 70% permanent vegetation.

1. Perimeter Filter Fabric Fence. Provide perimeter filter fabric fence to pond stormwater and trap sediment from sheet flow runoff. Use perimeter filter fabric fence as prescribed in the OEPA NPDES Permit.

2. Inlet Protection. Provide inlet protection on storm sewer inlets to pond stormwater and trap sediment from entering the storm system. Install inlet protection for new inlets once the inlet has potential to accept runoff. Utilize BMP that are capable of bypassing high flow events to avoid flooding of public streets or private properties.

3. Curb Inlet Protection. Utilize Alternative BMP for Curb Inlet Protection in accordance with this Section and 832.10 SWPPP Acceptance. Provide curb inlet protection on storm sewer inlets to pond stormwater and trap sediment from entering the storm system. Install inlet protection for new inlets once the inlet has potential to accept runoff. Utilize BMP that are capable of bypassing high flow events to avoid flooding of public streets or private properties. Use

accepted below grade inlet protection products as Alternative BMP when ponding water onto public streets may cause hazardous conditions or snow and ice equipment may damage the BMP.

4. Excavated Drop Inlet Protection. Provide excavated drop inlets as appropriate for phased construction. Construct per the Ohio Rainwater and Land Development manual with weep holes and #57 gravel filter. Provide stormwater ponding storage at 135 CY per acre of tributary drainage area. Do not use this control next to open traffic without a traffic control barrier.

5. Sediment Trap/Dam. Provide sediment traps/dams where feasible to intercept and treat concentrated runoff from tributary areas of 5 acres or less. Sediment traps/dams contain a dewatering zone, sediment storage zone and a rock filter outlet. Design the sediment trap/dam to meet the requirements of the OEPA NPDES Permit.

6. Sediment Basin. Provide sediment basins where feasible to intercept and treat concentrated runoff from tributary areas of 5 acres or more. Sediment basins contain a dewatering zone, sediment storage zone and a designed outlet with surface dewatering device. Design the sediment basin to meet the requirements of the OEPA NPDES Permit. Sediment traps/dams may be used to treat runoff from tributary areas of 5 acres or less.

7. Filter Fabric Ditch Check. Provide filter fabric ditch checks where feasible to intercept and treat concentrated runoff from tributary areas of 2 acres or less. Filter fabric ditch checks contain geotextile fabric with stone backing (or straw bales only when allowed by the Engineer per SCD DM-4.4). Use this control only when sediment traps/dams are impractical or may cause safety hazards. A maximum of two filter fabric ditch checks may be placed in series for a maximum treatment area up to 4 acres.

B. Erosion Controls. Install erosion controls concurrent with the work areas to protect against surface erosion and sediment loss. Erosion controls are not intended to remove sediment suspended in stormwater. All stormwater discharges from erosion controls are required to be directed to an appropriate sediment control.

1. Construction Seed and Mulch. Furnish commercial fertilizer, seed, and mulch materials conforming to C&MS 659. Apply seed and straw mulch materials according to C&MS 659 as modified below.

Apply straw mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m^2). This BMP may only be installed after March 15 and before October 15. Use wood fiber or compost mulch only with concurrence of the Department. Fertilize construction seeding areas at one-half the application rate specified in C&MS 659. If project conditions prevent fertilizing the soil, then the fertilizing requirements of C&MS 659 may be waived. Do not place construction seed or fertilizer on frozen ground. Apply seed and mulch for this BMP at the rates shown below.:

Seed Mixture	Number of Bales
Annual Ryegrass 2 lb./1000 ft^2 (10 kg/1000 m^2)	2 / 1000 ft^2 (0.01 ha)

2. Winter Seed and Mulch. Apply seed and straw mulch materials according to C&MS 659 as modified below. Apply straw mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m^2). Winter Seed and Mulch is required for EDA operations occurring between October 15 and

March 15 and can only be installed during that time. When straw mulch is used in this BMP, it is required to be crimped in place. Crimped mulch is required to be anchored into the soil surface with a mechanical crimping implement or other suitable implement accepted by the Engineer. Bonded Fiber Matrix (BFM) may be used instead of straw mulch. BFM product and application rates should be selected to ensure extended periods of stabilization protection during winter months. Select BFM or alternative mulch products with an expected functional longevity of 6 months or more. Provide maintenance of the BMP throughout the winter seed and mulch period. Utilize slope drains, stormwater diversions or other erosion control BMP with winter seed and mulch to provide appropriate protection of the winter seed and mulch areas. The Department will not compensate for repairs or reapplication of winter seed and mulch resulting from inappropriate application or failure to appropriately protect the winter seed and mulch areas. The use of other seed and/or mulch materials in this time period requires specific Department approval. The use of winter seeding and mulching is not an acceptable practice for protecting the subgrade surface where pavement is anticipated.

Seed Mixture	Number of Bales
Fawn Tall Fescue 3.0 lb./1000 ft^2 (15 kg/1000 m^2) and Annual Ryegrass 2 lb./1000 ft^2 (10 kg/1000 m^2)	2 / 1000 ft^2 (0.01 ha)

3. Construction Mulch. Construction Mulch is the application of straw mulch applied directly to the disturbed soil surface. Use straw according to C&MS 659. C&MS 659 wood fiber or compost mulch may only be used with concurrence of the Department. Apply Construction Mulch to areas that require temporary stabilization and where temporary vegetation is not considered desirable. Use a mechanical crimping implement or other suitable implement accepted by the Engineer when installing Construction Mulch on exposed subgrade. Apply Construction Mulch at a rate of 3 tons per acre (0.7 metric ton/1000 m^2).

4. Slope Drain. Provide slope drains to temporarily convey stormwater and protect cut and fill slopes from surface erosion. Use earthen dikes/berms to direct stormwater to the slope drains. Design the slope drains to adequately convey stormwater for a 10-year storm event where practicable.

5. Earthen Dike/Berm. Provide earthen dikes/berms to temporarily divert and convey stormwater. Construct earthen dikes/berms prior to cut slope construction and concurrently with fill slope construction.

6. Construction Entrance. Furnish Construction Entrance materials conforming to C&MS 712.09 Type D Filter Blankets for Rock Channel Protection and C&MS 703.01, Size Number 1 and 2, CCS aggregate. Furnish Construction Entrance protection at the locations shown on the SWPPP and as required below:

a. At locations where construction vehicles enter or leave EDA areas.

b. At all points of egress to public roads.

c. At all access locations where runoff from the construction access road is not protected by sediment controls.

Provide the appropriate size culvert as needed to prevent water from flowing onto paved surfaces and from overtopping the construction entrance surface. Identify the culvert size on the SWPPP. Install a maximum of three Construction Entrances per mile along the length of the project. The length of the project is the plan length along the project's longest axis. Additional construction entrances in excess of the maximum require acceptance from the Engineer.

Provide a configuration consisting of 6 inches of aggregate over geotextile fabric. Provide geometry according to a Type 1 Driveway as shown in the SCD. Provide a minimum 10 foot width and length measuring a minimum of 150 feet and not exceeding 200 feet from edge of pavement.

Construction Entrance removal includes the appropriate disposal of geotextile fabric and pipe. Aggregate may be incorporated into embankment work in accordance with C&MS 203 when approved by the Engineer.

7. Rock Ditch Check. Provide rock ditch checks in open channel conveyances for velocity control and to protect against surface erosion of the channel. Install rock ditch checks concurrently with channel grading. Remove rock ditch checks once 70% permanent vegetation has established in the channel.

8. Rock Channel Protection. Provide rock channel protection without fabric for rock ditch checks. Provide rock channel protection with fabric for all other BMP. Provide rock channel protection as recommend by the SWPPP Designer and accepted by the Engineer for other applications to prevent surface erosion.

9. Temporary Stabilization Matting. Provide temporary matting on permanent slopes and permanent open channel conveyances for temporary stabilization and for the establishment of permanent vegetation. Provide temporary matting per C&MS 671. Install temporary matting on slopes and open channel conveyances after final surface preparation within timeframes listed in the OEPA NPDES Permit for permanent stabilization.

C. Aquatic and Environmental Resource Protection. Provide construction fence for demarcation of aquatic and environmental resources when shown on the SWPPP and accepted by the Engineer. Alternative types of demarcation may be allowed when accepted by the Engineer. Provide appropriate sediment and erosion control protection to all environmental and aquatic resources on and, adjacent to the project. Aquatic and environmental resource protection may include diverting project water flow using dikes and slope protection and using sediment controls to intercept project runoff. The Contractor may use a combination of BMP as appropriate. Show all aquatic and environmental resources located within & adjacent to the Project and all Contractor EDA on the SWPPP.

D. Stream Relocation, Temporary Diversion Channels that carry Waters of the United States. Perform this work in compliance with the OEPA NPDES Permit and in conformance with all contract requirements (Waterway Special Provisions). Stabilize Stream Relocation, Temporary Diversion Channels with appropriate stabilization BMP or 70 percent vegetative growth before diverting flow into the new channel.

E. Concrete Washout Area BMP. Compensation for this BMP is incidental to the concrete work.

F. Dewatering BMP. Compensation for this BMP is incidental to the corresponding work. This BMP does not include a Surface Dewatering Device installed as part of a Sediment Basin.

G. Project fueling and refueling BMP locations. Compensation for this BMP is incidental to the project.

The SWPPP shall include BMP to prevent and respond to spills or leaks as required by the OEPA NPDES Permit.

The Contractor will provide a separate Spill Prevention Control & Countermeasure Plan (SPCC) if required as described in 40 CFR Part 112. The Contractor will not be compensated for the SPCC Plan. Spill response protocols are to be included in the SWPPP when not included in a SPCC.

H. All other BMP that are required and not specifically referenced in Appendix F or not accepted as an Alternative BMP in accordance with this section will not be paid as a separate item, but will be included by the Contractor as part of the total project cost.

832.06 Temporary Access Fills (Causeways and Access Fills). Fording of jurisdictional waters, including all streams and rivers is not allowed. Evaluate the Waterway Special Provisions to determine whether or not temporary access fills are permitted in the contract. If temporary access fills have been permitted by the Department, construct fill(s) consistent with the Waterway Special Provisions and additional contract requirements. Only the footprint area (acreage), linear impact limits and volume of temporary fill as permitted and contained in the Waterway Special Provisions will be allowed. If the Contractor proposes temporary access fill(s) which has not been permitted by the Department, the Contractor will coordinate procurement of the permits with the appropriate regulatory agency/agencies. All costs and time associated with the procurement of the permits are incidental to the Work. If the Contractor requests modification of the Department procured permits, coordinate the request with the Engineer and OES. The Department makes no guarantee to grant the permit modification request.

832.07 Temporary Access Fills Construction. Begin planning and installing temporary access fills as early in construction as possible to avoid conflicts with the Waterway Special Provisions or other environmental commitments that have been included in the contract documents.

Temporary access fills in aquatic resources may include, but are not limited to, causeways, cofferdams, access pads, sheet piling, temporary bridges, access fills, etc.

Make every attempt to minimize disturbance to aquatic resources during construction, maintenance and removal of the temporary access fills. The Contractor must make every attempt to minimize disturbance to waterbodies, stream banks, stream beds and riparian zones during the construction, maintenance, and removal of the temporary access fills. Construct the temporary access fills as narrow as practical and perpendicular to the stream banks. Make the temporary access fills in shallow areas rather than deep pools where possible. Minimize clearing, grubbing,

and excavation of stream banks, bed, and approach sections. Construct the temporary access fills as to not erode stream banks or allow sediment deposits in the channel.

Prior to the initiation of any in-stream work, establish a monument upstream of proposed temporary access fill to visually monitor the water elevation in the waterway where the fill is permitted. Maintain the monument throughout the project. Provide a visual mark on the monument that identifies the elevation 1 foot above the Ordinary High Water Mark (OHWM). If the OHWM is not shown on the plans, the Department will establish the OHWM based on the definition of OHWM (832.02) or the peak discharge from the 2 year event, using the method described in the most current version of the Department's Location and Design Manual Volume II. Ensure that the monument can be read from the bank of the waterway. Ensure that this work is supervised by an Ohio Registered Surveyor. All costs associated with furnishing and maintaining the above referenced monument is incidental to the Work.

Construct the temporary access fills to a water elevation at least 1 foot (0.3 m) above the OHWM. If more than one-third of the width of the waterway is filled, then use culvert pipes to allow the movement of aquatic life. Maintain normal downstream flows. Ensure that any ponding of water behind the causeway and access fills will not damage property or threaten human health and safety.

The following minimum requirements apply to causeways where culverts are used.

A. Furnish culverts on the existing stream bottom.

B. Avoid a drop in water elevation at the downstream end of the culvert.

C. Furnish a sufficient number of culverts in addition to stream openings to providing a discharge equal to twice the highest monthly flow without producing a rise in the backwater above the OHWM.

D. Furnish culverts with a minimum diameter of 18 inches (0.5 m)

All temporary access fills must be constructed of suitable materials. Causeways and access fills must be encapsulated with clean, non-erodible, nontoxic Dumped Rock Fill, Type A, B, C, or D, as specified in C&MS 703.19.B. Extend rock fill up the slope from original stream bank for 50 feet (10 m) to catch and remove erodible material from equipment.

All portions of the temporary access fills will be removed in its entirety. Do not dispose of temporary access fill material in other aquatic resources or where erosion into another aquatic resource is possible. The stream bottom affected by the temporary access fills will be restored to its pre-construction elevations. The temporary access fills will not be paid as a separate item but will be included by the Contractor as part of the total project cost.

All environmental protection and sediment and erosion controls associated with the Waterway Special Provisions or Contractor procured permits are incidental to the work within the boundaries of the permits.

832.08 Maintenance. Properly maintain all BMP throughout all phases and sequencing of construction activities. Dispose of silt removed from BMP according to C&MS 105.16. When the

Contractor properly places the erosion control Items then the Department will pay for the cost to maintain or replace these items of work by the following:

If a recorded rain event is greater than 0.5 inches (13mm), the Department will pay to replace all BMP that have been damaged as a result of the rain event at the unit price for those BMP including Sediment Removal as described in Appendix F. Record BMP replacement quantities using the SWPPPTrack software inspection software application. Replacement quantities not recorded in the SWPPPTrack software inspection software application will not be compensated. Restoration maintenance necessary to restore the BMP as a result of a rain event is included in the unit price for the BMP.

If a recorded rain event is less than or equal to 0.5 inches (13mm), the Department will pay to remove the sediment per the unit price for Sediment Removal as described in Appendix F. No compensation will be provided for BMP that are damaged as a result of rain events less than or equal to 0.5 inches (13mm).

Example: A 0.6 inch rain event damaged a 300 ft. segment of filter fabric fence. A 200 ft. segment was knocked over but was still functional and could be restored. The 300 ft. damaged segment was replaced and the sediment was removed. The 200 ft. segment was picked up, retrenched and the sediment removed. How do we pay for the 300 ft. damaged segment and the 200 ft. restored segment and the sediment removal?

Pay for 300 ft. of new Item Perimeter Filter Fabric Fence and Item Miscellaneous Sediment Removal. Do not pay for restoration of the 200 ft. segment of restored filter fabric fence. Pay for Item Miscellaneous Sediment Removal for the 200 ft. segment.

For all Perimeter Filter Fabric Fence, Filter Fabric Ditch Checks, Rock Checks, and Inlet Protection, Dikes, remove trapped sediment and any other debris which has accumulated when sediment reaches a height of one-half the BMP. Compensation will be paid at the unit price for Miscellaneous Sediment Removal as described in Appendix F.

When the sediment fills the sediment storage zone (as described in the OEPA NPDES Permit) of a Sediment Basin or Sediment Trap/Dam, remove deposited sediment per the unit price for Basin Sediment Removal as described in Appendix F. Remove Sediment Basins and Sediment Traps/Dams after the contributing drainage area has been stabilized.

When erodible materials accumulate at the surface of the construction entrance, furnish additional stone as needed to prevent tracking. Compensation for additional stone needed to maintain the Construction Entrance will be paid at the unit price for Construction Entrance. If tracking occurs, restore and clean the affected roadway surface at no additional cost to the Department.

Maintain the BMP until 70% permanent vegetation is established in the EDA portion of the tributary area contributing runoff to the BMP in accordance with the OEPA NPDES Permit (See Appendix E, Part VII, J). Remove BMP after 70% permanent vegetation is established. The Engineer may allow early removal of BMP, when necessary, due to BMP inaccessibility. Dispose of the removed materials including sediment according to C&MS 105.16 and C&MS 105.17.

832.09 Storm Water Pollution Prevention Plan. If required, prepare the SWPPP as outlined in this specification. Submit the SWPPP to the Engineer for acceptance using the SWPPPTrack software web platform. Allow 14 days for the initial review of the SWPPP. Address all comments from the Engineer and submit any required revisions, modifications, phases and updates using the SWPPPTrack software web platform. Allow an additional 7 days for subsequent reviews. All activity identified by the SWPPP that is not specifically identified as a pay item elsewhere shall be included in the Lump Sum price bid for the Storm Water Pollution Prevention Plan. At a minimum, the design and information requirements that must be included in the SWPPP are as follows:

A. Include the following general information:

1. Provide a site specific SWPPP designed and sealed by a Professional Engineer who holds a current CPESC certification.

2. Furnish the names of the individuals on site who will serve as the PE/CPESC SWPPP designer and CECI.

3. Describe the type of construction activities that will be taking place.

4. Furnish signatures of all contractors and subcontractors involved in BMP practices (see Appendix B).

5. Furnish the total EDA areas in acres and identify the immediate receiving stream or surface water for each drainage area.

6. Furnish installation details of all proposed Alternative BMP.

7. Provide construction and grading details for all Sediment Trap/Dam and Basins.

B. Include Existing Condition Plan sheets (maximum 1" = 50' scale) showing the following information at a minimum:

1. Temporary sediment control BMP to be installed prior to or concurrent with early earth disturbing activities (including but not limited to clearing and grubbing, mobilization, staging areas, demolition, grading activities, etc.)

2. Existing contours shown at a 2-foot maximum interval for all Project and Contractor EDA areas

3. Stormwater runoff tributary areas to all sediment controls intercepting concentrated flows (Tributary areas for sheet flow sediment controls are not required to be shown on the plan.)

4. Existing conditions of the Project and Contractor EDA including drainage patterns, ditches, drainage system, utilities

5. Project construction limits

6. All Contractor EDA areas

7. Labels of all direct discharge locations receiving runoff from Project and Contractor EDA to waters of the State or U.S throughout the Project and Contractor EDA. Direct discharges may include but are not limited to, storm sewer outfalls, open channel conveyances, direct sheet flow.

8. Provide a table of existing condition BMP and direct discharge locations in tabular format on the plan which can be exported to .csv file and is consistent with SWPPPTrack software

C. Include Proposed Condition Plan sheets (maximum 1" = 50' scale) showing the following information at a minimum:

1. Temporary sediment and erosion control BMP based on modified drainage patterns as needed to represent construction phasing prior to reaching final buildout conditions.

2. Temporary sediment and erosion control BMP based on final buildout conditions and drainage patterns. Include BMP to be installed during previous phasing which is intended to be left in place through final buildout.

3. Proposed contours shown at a 2-foot maximum interval for all Project and Contractor EDA areas. If proposed surfaces cannot be obtained from the Department provided electronic files, provide clear representation of the proposed drainage patterns in sufficient detail to select, design and locate appropriate BMP.

4. Stormwater runoff tributary areas to all sediment controls intercepting concentrated flows (Tributary areas for sheet flow sediment controls are not required to be shown on the plan.)

5. Project construction limits

6. All Contractor EDA areas

7. Label existing, relocated and proposed direct discharge locations

8. Provide a table of proposed condition and interim BMP in tabular format on the plan which can be exported to .csv file and is consistent with SWPPPTrack software

D. Include BMP estimated quantities in BMP tables.

E. Show the location of the following support activities. Ensure the following activities are located a minimum of 100 feet (30 m) from any aquatic resource:

1. Concrete or asphalt plant areas

2. Material and equipment staging or storage areas

3. Dewatering Areas

4. Concrete truck wash out BMP areas

5. Construction access BMP locations

6. Vehicle fueling and refueling locations

F. Provide an implementation schedule for BMP based on the Contractor's proposed construction sequence.

G. Show locations of Post-Construction BMP. Include Post-Construction BMP in the schedule of construction sequence.

H. Include a schedule of cover practices meeting the requirements of the Ohio NPDES Permit.

I. Include erosion control BMP to be installed for protecting erosive areas, provide temporary or permanent stabilization and control stormwater. Stormwater erosion control BMP shall be sized based on tributary runoff area and consistent with Ohio's Rainwater and Land Development Manual.

J. Show all environmental preservation areas, wetlands and waterways within or adjacent to the Project and Contractor EDA as illustrated in the Plans.

K. Furnish an estimated quantity for Basin Sediment Removal and Miscellaneous Sediment Removal for removing sediment from sediment controls.

L. Include project area soil types and identify any potentially highly erodible locations.

M. Label all sediment Trap/Dam and Basins with tributary area, sediment storage zone volume, dewatering zone volume, outlet size and type, etc.

Electronic design files, necessary to develop the SWPPP with the required information listed in this section, shall be made available to the awarded Contractor upon request.

832.10 SWPPP Acceptance. Furnish the SWPPP to the Department for acceptance. The Department will allow work to begin upon receiving an acceptable SWPPP. See Appendix C for a sample acceptance checklist. The Department may assess critically the following:

A. The type and location of BMP with totals.

B. The SWPPP is specific for this project.

C. There is no language in the SWPPP about any BMP being directed for use by the Engineer.

D. The total estimated BMP quantities agree with the (per Each) "Erosion Control" amount identified in the proposal.

E. The SWPPP accounts for the various phases of construction and the associated degree of earthwork disturbance over the life of the project.

F. The SWPPP delineates overall watershed areas and individual BMP watersheds. Enough detail is shown in the SWPPP to verify that the BMP are appropriate for the application. If topographic mapping contained in the plans is not sufficient to identify and delineate the watersheds associated with the work, provide the appropriate mapping.

G. The SWPPP identifies the locations and specific geometry of the required Sediment Traps/Dams, Basins and related control structures. Provide the following information for each Sediment Trap/Dam and Basin:

1. Calculations demonstrating compliance with the 48 hour draw down time (if required by the OEPA NPDES Permit),

2. Size of the contributing drainage area,

3. Volume of the Sediment Storage Zone

4. Volume of the Dewatering Zone

5. Basin excavation quantity or dam embankment quantity

6. Quantity of rock channel protection

7. Riser Pipe, outlet structure details and surface dewatering device

Revise the accepted SWPPP as needed to maintain compliance with OEPA NPDES Permit. Revisions and amendments (See Appendix E, Part III, D) to the accepted SWPPP will be at no additional cost to the Department.

832.11 Inspections and SWPPP Updates. Perform the OEPA NPDES Permit required inspections utilizing a mobile device capable of running the latest version of the SWPPPTrack LTIS inspection software application developed by Storm Water Simplified Ltd. Contact Storm Water Simplified Ltd. at (888) 401-1993 or OHSupport@SWPPPTrack.com for project setup coordination, payment, and for mobile device requirements.

Perform OEPA NPDES Permit required inspections with the SWPPPTrack inspection application and populate all inspection fields accurately to represent current project conditions until final stabilization.

The inspections must be performed by one of the following parties:

A. The PE/CPESC who signed and sealed the SWPPP.

B. The CPESC inspector who is under the supervision of the Engineer who signed and sealed the SWPPP.

C. The CESSWI inspector who is under the supervision of the Engineer who signed and sealed the SWPPP.

Prepare the inspection reports for projects that require a SWPPP. Utilize the SWPPPTrack inspection software application to prepare and submit inspection reports to the Engineer every 7 days and within 24 hours of a 0.5 inch (13 mm) or greater rainfall event until final stabilization has been established with a minimum of 70 percent permanent vegetation. The inspection occurrence may be delayed or the inspection frequency may be reduced per the OEPA NPDES Permit Part III.G.2.i.

The reporting CECI, under supervision of the PE/CPESC, will update, amend and revise the SWPPP as the contractor's operations and site conditions warrant. Identify all revisions and updates to the SWPPP and indicate what measures will be taken to maintain OEPA NPDES Permit compliance. Record BMP condition, modifications, installations, additions, removals and SWPPP modifications with the SWPPPTrack inspection software application. Record all BMP locations utilizing the SWPPPTrack inspection software application.

Document BMP inspections utilizing photos as required by the SWPPPTrack inspection software application. Perform a monthly inspection of the project utilizing the SWPPPTrack inspection software application. The monthly inspection is required to be performed by the PE/CPESC who maintains responsibility over the SWPPP. The monthly inspection may be performed by an individual employed by the PE/CPESC company who is under the direct supervision of the PE/CPESC. If the inspection is performed by an individual other than the PE/CPESC, the individual shall maintain an active CPESC certification. The PE/CPESC is required to review and certify all monthly inspections through the SWPPPTrack software inspection application. The PE/CPESC shall review the weekly and rainfall event inspections and all CECI changes to the SWPPP. The PE/CPESC is required to re-sign and seal the SWPPP when significant changes warrant an updated SWPPP be developed. Submit the latest SWPPP update to the SWPPPTrack software web platform.

The CECI is required to notify the Department within 24 hours of any compliance deficiencies or verified complaints related to the SWPPP or OEPA NPDES Permit. Weekly, rainfall event and monthly inspections will document BMP deficiencies as Open Work Items in the SWPPPTrack inspection software application. Within 48 hours of the Department's or CECI's notice of deficiency/Open Work Item, the contractor is required to construct, install, repair or correct the BMP measures needed to close the deficiency/Open Work Items. The CECI will close Open Work Items only after the BMP measures have been appropriately addressed and inspected utilizing the SWPPPTrack inspection software application.

832.12 Compensation. The Department will furnish Item 832 Each, Erosion Control with an amount in the proposal to pay for BMP work. The fixed amount shown in the proposal is included (as any other bid items) in the Total Bid Amount. This fixed amount is the Department's estimate of the total cost of BMP work required to be performed for the project. If the BMP work exceeds this amount, the BMP work will still be paid at the pre-determined prices. All BMP work will be paid at the proposal pre-determined unit price times the correctly installed BMP number of units. The payment due will be deducted from Item 832 Each, Erosion Control. C&MS Table 104.02-2 does not apply to reductions in this contract item. Compensation for BMP will not be provided until the BMP location and quantity is recorded in the SWPPPTrack inspection software application and an initial inspection is performed by the CECI indicating that the BMP meets the installation requirements.

The Lump Sum amount bid for the SWPPP includes all work associated with development, design, revisions, modifications, amendments and submittals of the SWPPP. Changes made to the SWPPP, but not caused by the Department, are the financial responsibility of the Contractor. Additional compensation will only be permitted for Department accepted amendments to the SWPPP resulting from revisions to the contract documents as per sections 104.02.B, 104.02.D and 104.02.F. Provide the additional costs for the amended SWPPP to the Department prior to

beginning the associated revised work. The Department will only pay for one accepted SWPPP regardless of the number of Construction phases, revisions, amendments or project redesigns.

The Lump Sum amount bid for the Storm Water Pollution Prevention Inspections includes all work associated with NPDES required inspections, monthly inspections, and reporting. All costs associated with providing and maintaining the required CPESC and CESSWI personnel, conducting the NPDES required inspections utilizing the SWPPPTrack inspection software application and support engineering services are included in the contract Lump Sum bid for Storm Water Pollution Prevention Inspections.

The Lump Sum amount bid for the Storm Water Pollution Prevention Inspection Software includes all costs for the SWPPPTrack inspection software and services. The Contractor is responsible for purchasing and contracting with Storm Water Simplified Ltd. for the use of the SWPPPTrack software application and services until final stabilization.

832.13 Method of Measurement.

The Department will measure the SWPPP as a Lump Sum.

The Department will measure the Storm Water Pollution Prevention Inspections as a Lump Sum.

The Department will measure the Storm Water Pollution Prevention Inspection Software services as Lump Sum.

The Department will measure Construction Seeding and Mulching by the number of square yards (square meters).

The Department will measure Slope Drains by the number of feet (meters) of conduit.

The Department will measure Sediment Basins by the number of cubic yards (cubic meters) of excavation or embankment.

The Department will measure Sediment Basin surface dewatering device by each.

The Department will measure Sediment Traps/Dams by the number of cubic yards (cubic meters) of excavation or embankment.

Any pipe required for the outlet structure of a Sediment Basin or Trap/Dam is incidental to the unit price paid for Sediment Basins and Traps/Dams.

The Department will measure Perimeter Filter Fabric Fence, and Construction Fence by the number of feet (meters).

The Department will measure Filter Fabric Ditch Check by the number of feet (meters).

The Department will measure Excavated Drop Inlet Protection by the number of cubic yards (cubic meters) of excavation.

The Department will measure Inlet Protection by the number of feet (meters).

The Department will measure Curb Inlet Protection by each or feet (meters).

The Department will measure Earthen Dike/Berm by the number of cubic yards (cubic meters) of embankment.

The Department will measure Temporary Stabilization Matting by the number of square yards (square meters).

The Department will measure Rock Ditch Check, Type C or D (without filter) by the number of cubic yards (cubic meters).

The Department will measure Rock Channel Protection, Type C or D (with or without filter) by the number of cubic yards (cubic meters).

The Department will measure Sediment Removal by the number of cubic yards (cubic meters).

The Department will measure Construction Mulching by the number of square yards (square meters) regardless if the application is crimped or not.

The Department will measure Winter Seeding and Mulching by the number of square yards (square meters).

The Department will measure Construction Entrance protection by the number of cubic yards (cubic meters)

832.14 Basis of Payment. The Department will pay the contract Lump Sum price bid for the Storm Water Pollution Prevention Plan. The Department will make partial payments for the Storm Water Pollution Prevention Plan according to C&MS Section 109.09 and as modified by the following schedule:

A. The Department will release 60 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after the Engineer has accepted the Storm Water Pollution Prevention Plan submission.

B. The Department will release 30 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after 50 percent of the project is complete.

C. The Department will release the remaining 10 percent of the lump sum amount bid for Storm Water Pollution Prevention Plan to the Contractor with the first regular estimate payable after 90 percent of the project is complete.

The Department will make partial payment for the Storm Water Pollution Prevention Inspections according to C&MS Section 109.09.

The Department will make partial payments for the Storm Water Pollution Prevention Inspection Software services according to C&MS Section 109.09 and as modified by the following schedule:

A. The Department will pay 60 percent of the lump sum amount bid for the Storm Water Pollution Prevention Inspection Software with the first regular estimate.

B. The Department will pay the remaining 40 percent of the lump sum amount bid for the Storm Water Pollution Prevention Inspection Software services according to 109.09.

The Department will pay for appropriately selected, designed, properly installed and accepted BMP per Item 832 Each, Erosion Control. BMP compensation will be based on the unit prices shown in Appendix F or accepted unit prices for Alternative BMP by the Engineer.

The Department will not pay for BMP Items which are required as a result of the Contractor's negligence, carelessness, or failure to install permanent controls.

The Department will not pay for any causeway and access fills.

The Department will not pay to replace BMP that have failed as a result of improper maintenance or installation.

The Department will not pay for concrete washout area BMP. Concrete washout area BMP are considered incidental to the concrete work.

The Department will not pay for BMP which are required as a part of the work and are not specifically identified as a separate item. Compensation for BMP that are required for NPDES Permit compliance and are not included in Appendix F or not accepted as an Alternative BMP in accordance with Section 832.05 are considered incidental to the work.

The Department will not pay for Post-Construction BMP as a part of this specification.

Item	**Unit**	**Description**
832	Lump Sum	Storm Water Pollution Prevention Plan
832	Lump Sum	Storm Water Pollution Prevention Inspections
832	Lump Sum	Storm Water Pollution Prevention Inspection Software
832	Each	Erosion Control

Appendix A

BMPBMP Inventory Naming Validation

Ohio Department Of Transportation, SS 832 – *BMP ID and Naming Validation Form*

Sediment Control BMP

BMP ID Type	BMP ID Type (Extended Name)	Standard BMP Description	Alternative BMP Description	Unit of Measure
IP	Inlet Protection	Filter Fabric Inlet Protection		LF
CIP	Curb Inlet Protection	Alternative BMP	Dandy Curb Bag for 3A inlet	EA
EDIP	Excavated Drop Inlet Protection	Drop Inlet Excavation W/gravel		EA
PFFF	Perimeter Filter Fabric Fence	Filter Fabric Fence		LF
FFDC	Filter Fabric Ditch Check	Filter Fabric Ditch Check		LF
SB	Sediment Basin	Sediment Basin w/ Surface Dewatering		CY
ST	Sediment Trap	Sediment Trap		CY
DWT	Dewatering Discharge	Dewatering Sediment Control		EA
SDWTD	Sediment Basin Surface Dewatering Device	Surface Dewatering Device		EA

Erosion Control BMP

BMP ID Type	BMP ID Type (Extended Name)	Standard BMP Description	Alternative BMP Description	Unit of Measure
SD	Slope Drain	Slope Drain		LF
DI	Dike	Earthen Dike		CY
CE	Construction Entrance	Rock Construction Entrance		CY
RDC	Rock Ditch Check	Rock Ditch Check		CY
ECM	Erosion Control Matting	Erosion Matting, Type___		SY
RCP	Rock Channel Protection	Rock with Geotextile Fabric		CY
TS	Temporary Stabilization	Construction Seed and Mulch		SY
PS	Permanent Stabilization	Permanent Stabilization		SY

Miscellaneous Control BMP

BMP ID Type	BMP ID Type (Extended Name)	Standard BMP Description	Alternative BMP Description	Unit of Measure
CF	Construction Fence	Construction Fence		LF
CWO	Concrete Washout	Concrete Washout		EA
TAF	Temporary Access Fill	Causeway, Cofferdam, Dewatering Fill, etc.		EA

Outfalls

BMP ID Type	BMP ID Type (Extended Name)	Standard BMP Description	Alternative BMP Description	Unit of Measure
DSWD	Direct Surface Water Discharge	Direct Surface Water Discharge		

Designer Note: SWPPP Designers should utilize the BMP ID Type (short) naming conventions for BMP callouts and populating the BMP Inventory Tables shown in this appendix. BMP ID's should be numbered sequentially by Type (PFFF1, PFFF2, IP1, SB1, etc.). BMP ID Type (Extended Names) are not used in the BMP Inventory Tables and are included for reference only.

BMP ID Type and Standard BMP Descriptions will be used for validation when uploading the tables to SWPPPTrack. Ensure BMP Types and Standard BMP Descriptions above are used to create the BMP Inventory Tables. When Alternative BMP materials are proposed, the Alternative BMP Description name should be filled in with the proprietary device proposed on the SWPPP. The Alternative BMP Description should accurately describe the BMP with appropriate units. (i.e. 12" Compost Filter Sock, LF).) Curb Inlet Protection only utilize Alternative BMP and will always require an alternative description. Coordinate uploading of the inventory table with SWPPPTrack. BMP Inventory Table templates can be downloaded on ODOT's Office of Construction Administration website: http://www.dot.state.oh.us/Divisions/ConstructionMgt/Admin/Pages/InspectionForms.aspx

Appendix A

Existing Conditions BMP Inventory Table

Ohio Department Of Transportation, SS 832 - *Existing Conditions* - BMP Inventory Table			
Name:		Date Created:	
Company Name:			

Contract#	Part Code	BMP	Standard BMP Description	Alternative BMP Description	Plan Page	Quantity	Unit Of Measure	Roadway Name	Location Station	Road Orientatio	Project Discharge
		PFFF1	Perimeter Filter Fabric Fence		4	375	LF	SR 7	145+32	RT	Y
		PFFF2	Perimeter Filter Fabric Fence		4	235	LF	SR 7	145+85	LT	Y
		PFFF3	Alternative BMP	12" Compost Filter Sock	11	305	LF	SR 14	96+50	RT	N
		IP1	Inlet Protection		5, 10	20	LF	SR 14	94+00	RT	Y
		IP2	Inlet Protection		5, 10	20	LF	SR 14	94+00	LT	Y
		CIP1	Alternative BMP	Dandy Curb Bag (3A Inlet)	5, 10	1	EA	SR 14	93+00	LT	Y
		CIP2	Alternative BMP	FlexStorm Catch It	6	1	EA	SR 14	155+55	LT	Y
		CIP3	Alternative BMP		6	1	EA	SR 14	155+50	RT	Y
		FFDC1	Filter Fabric Ditch Check		8	15	LF	SR 14	86+50	RT	Y

Proposed BMP Inventory Table

Ohio Department Of Transportation, SS 832 - *PROPOSED* - BMP Inventory Table			
Name:		Date Created:	
Company Name:			

Contract#	Part Code	BMP ID	Standard BMP Description	Alternative BMP Description	Plan Page	Quantity	Unit Of Measure	Roadway Name	Location Station	Road Orientation	Project Discharge
		PFFF4	Perimeter Filter Fabric Fence		6,7	250	LF	SR 7	155+00	RT	Y
		CF1	Construction Fence		4	100	LF	SR 7	145+32	RT	N
		CF2	Construction Fence		4	230	LF	SR 7	145+85	LT	N
		CIP4	Alternative BMP	Dandy Curb Bag (3A Inlet)	4	1	EA	SR 7	146+25	LT	N
		CIP5	Alternative BMP	Dandy Curb Bag (3A Inlet)	4	1	EA	SR 7	146+40	LT	N
		CIP6	Alternative BMP	Dandy Curb Bag (3A Inlet)	4	1	EA	SR 7	146+60	LT	N
		CIP7	Alternative BMP	Dandy Curb Bag (3A Inlet)	4	1	EA	SR 7	146+40	RT	N
		CIP5	Alternative BMP	Dandy Curb Bag (3A Inlet)	4	1	EA	SR 7	146+60	RT	N
		CIP6	Alternative BMP	FlexStorm Catch It	4	1	EA	SR 7	148+35	LT	N
		CIP7	Alternative BMP	FlexStorm Catch It	4	1	EA	SR 7	148+40	LT	N
		CIP8	Alternative BMP	FlexStorm Catch It	4	1	EA	SR 7	148+35	RT	N
		CIP9	Alternative BMP	FlexStorm Catch It	4	1	EA	SR 7	148+35	RT	N
		CIP10	Alternative BMP	FlexStorm Catch It	5	1	EA	SR 7	150+35	RT	N
		CIP11	Alternative BMP	FlexStorm Catch It	5,10	1	EA	SR 14	94+40	RT	N
		CIP12	Alternative BMP	Dandy Curb	5,10	1	EA	SR 7	150+70	RT	N
		CIP13	Alternative BMP	Dandy Curb	5,10	1	EA	SR 7	150+85	LT	N
		CIP15	Alternative BMP	Dandy Curb	5,10	1	EA	SR 14	94+50	LT	N
		IP3	Alternative BMP	42" SedCatch SedCage	5,10	1	EA	SR 7	92+85	LT	Y
		IP4	Filter Fabric Inlet Protection		5,10	1	LF	SR 7	152+50	LT	N

Appendix B

SIGNATURE LIST

NPDES and Surface Water Pollution Prevention Plan
Contractors and Sub-contractors responsible for any Earth Disturbing Activity
Duty to inform contractors and subcontractors
(OEPA Permit No.:OHC000005 Part III. E)

Signature	Printed Name	Title	Company	Date

OHIO DEPARTMENT OF TRANSPORTATION	**Appendix C SWPPP Review Form**	ODOT Project Ct.-Rt.-Sec:_____ Proj. #/PID:_____ Date:_____

Question #	Question	YES	NO	N/A	Comments
1	Is the SWPPP specific to the purposed project?				
2	Has the Contractor filed for a Co-Operator's notice to OPEA?				
3	Does the SWPPP list "Operators" and contain signatures of responsible parties? (Any Contractor or sub who has day-to-day operational control over sediment and erosion control activities)				
4	Was the plan developed by a P.E./CPESC qualified individual?				
5	Does the SWPPP list the CECI?				
6	Does the SWPPP show installation details of all proposed Alternative BMP?				
7	Have the proposed Alternative BMP been accepted for use by the Engineer?				
8	Does the SWPPP include existing conditions plan sheets identifying BMP's to be installed with early earth disturbing activities? (i.e. mobilization, clearing and grubbing, tree clearing, contractor staging, demolition, etc.) (Ref. 832.09 B.)				
9	Does the SWPPP include proposed conditions plan sheets identifying BMP's to be installed based on final buildout drainage patterns? (Ref. 832.09 C.)				

Question #	Question	YES	NO	N/A	Comments
10	Have all discharge points, having a direct connection to a waterway, been labeled on the SWPPP? (Direct connections include ditches, channels, storm sewer outlets, direct sheet flow.)				
11	Have sediment controls been included on the SWPPP, intercepting all potential runoff from project and contractor disturbed areas?				
12	Have drainage tributary areas been identified for all sediment controls intercepting concentrated flows? (i.e. sediment traps/basins, FFDC, inlet protection) (Verify tributaries for existing condition BMP and tributaries for proposed condition BMP, Ref. 832.09)				
13	Are the selected sediment control BMP's appropriate for their tributary area? (i.e. 5 Ac max for sediment traps, 2 Ac max for FFDC, 1 Ac max for inlet protection)				
14	Are sediment traps/basin used for tributary areas exceeding 2 acres? (Sediment traps and basins should be used for larger drainage areas unless ponding water may cause a safety hazard to the public. Sediment traps/basins should be a SWPPP Designer's first option for sediment treatment.)				
15	Are volume sizing calculations shown on the SWPPP for all sediment traps/basins? (Traps/basins require a minimum 67 CY per acre dewatering zone plus 37 CY per acre sediment storage zone.)				
16	Does the SWPPP show preservation areas, wetlands, waterways within and adjacent to the project?				

Question #	Question	YES	NO	N/A	Comments
17	Does the SWPPP include all contractor EDA? (i.e. borrow/waste, staging areas, etc.)				
18	Does the SWPPP include a BMP implementation schedule that aligns with the Contractor's construction sequence?				
19	Does the SWPPP show fuel storage locations and list procedures for spill prevention and countermeasures?				
20	Are concrete washouts, fuel storage, staging areas shown on the plan? (Ensure these activities are a minimum 100-feet away from a waterway.)				
21	Are construction entrances shown at all points of egress?				
22	Does the SWPPP show a schedule of stabilization practices? (i.e. temporary and permanent seeding based on dormant areas)				
23	Does the SWPPP show soil types and identify any highly erodible areas? (i.e. steep slopes requiring additional erosion control BMP)				
24	Do all BMP include adequate details for installation? (Ensure all BMP can be appropriately installed as shown on the plans)				

Appendix D

Co-Permittee Notice of Intent for Coverage Under Ohio EPA Storm Water Construction General Permit

Submission of this NOI constitutes notice that the party identified in Section I of this form intends to be authorized by Ohio's NPDES general permit for storm water associated with construction activity. Becoming a permittee obligates a discharger to comply with the terms and conditions of the permit. NOTE: All necessary information must be provided on this form. Read the accompanying instructions *carefully* before completing the form. Do not use correction fluid on this form. Forms transmitted by fax will not accepted. There is no fee associated with submitting this form.

I. Applicant Information/Mailing Address

Company (Applicant) Name: _____

Mailing (Applicant) Address: _____

City: _____ State: _____ Zip Code: _____

Contact Person: _____ Phone: _____ Fax: _____

Contact E-Mail Address: _____

II. Facility/Site Location Information

Existing Ohio EPA Facility Permit Number: __ GC __ __ __ __ __ * __ G OR OHR1 __ __ __ __ __

Initial Permittee Name: _____ Phone: _____

Facility/Site Name: _____

City: _____ Township(s): _____

County(ies): _____ State: Ohio Zip Code: _____

Facility Contact Person: _____ Phone: _____ Fax: _____

Facility Contact E-Mail Address: _____

III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Applicant Name: _____ Title: _____

Applicant Signature: _____ Date: _____

EPA 4496 (Rev. 4/03) Click to clear all entered information CLEAR

Information available at *https://epa.ohio.gov/dsw/permits/gpfact#137794352-applying-for-coverage*

Appendix E
http://www.epa.state.oh.us/portals/35/permits/OHC000005/Final_OHC000005.pdf

Issuance Date: April 23, 2018
Effective Date: April 23, 2018
Expiration Date: April 22, 2023

Ohio EPA APR 23 '18
Entered Directors Journal

OHIO ENVIRONMENTAL PROTECTION AGENCY

GENERAL PERMIT AUTHORIZATION FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et. seq. hereafter referred to as "the Act") and the Ohio Water Pollution Control Act [Ohio Revised Code ("ORC") Chapter 6111], dischargers of storm water from sites where construction activity is being conducted, as defined in Part I.B of this permit, are authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA," to discharge from the outfalls at the sites and to the receiving surface waters of the state identified in their Notice of Intent ("NOI") application form on file with Ohio EPA in accordance with the conditions specified in Parts I through VII of this permit.

It has been determined that a lowering of water quality of various waters of the state associated with granting coverage under this permit is necessary to accommodate important social and economic development in the state of Ohio. In accordance with OAC 3745-1-05, this decision was reached only after examining a series of technical alternatives, reviewing social and economic issues related to the degradation, and considering all public and intergovernmental comments received concerning the proposal.

This permit is conditioned upon payment of applicable fees, submittal of a complete NOI application form, development (and submittal, if applicable) of a complete Storm Water Pollution Prevention Plan (SWP3) and written approval of coverage from the director of Ohio EPA in accordance with Ohio Administrative Code ("OAC") Rule 3745-38-02.

Craig W. Butler
Director

Total Pages: 60

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: Date: 4-23-18

Appendix F

Temporary Sediment and Erosion Control Best Management Practices (BMP) Unit Price Schedule, October 2018

EROSION CONTROL PRICES

			Project Identified EDA (acres)					Fixed Price ($)	Comment
			<5	5 to 10	10 to 15	15 to 20	>20		
Item	**Unit**	**Description**	Price ($)						
832	Sq. Yd.	Construction Seeding and Mulching	1.00	0.92	0.83	0.75	0.74		Based on NOI acres
832	Feet	Slope Drains						12.00	
832	Cu. Yd.	Sediment Basins and Dams						13.50	[3]
832	Cu. Yd.	Excavated Drop Inlet Protection						13.50	
832	Feet	Perimeter Filter Fabric Fence	4.05	3.10	2.85	2.55	2.30		Based on NOI acres
832	Feet	Filter Fabric Ditch Check						11.00	
832	Feet	Inlet Protection						11.25	
832	Cu. Yd.	Earthen Dike/Berm						3.00	
832	Sq. Yd.	Temporary Stabilization Matting						2.50	
832	Cu. Yd.	Rock Ditch Check, Type C or D without Filter						50.00	[1]
832	Cu. Yd.	Rock Channel Protection, Type C or D with Filter						55.00	[1]
832	Cu. Yd.	Rock Channel Protection, Type C or D without Filter						50.00	[1]
832	Cu. Yd.	Basin Sediment Removal						10.00	
832	Cu. Yd.	Miscellaneous Sediment Removal						15.50	
832	Feet	Construction Fence						5.75	
832	Sq. Yd.	Construction Mulching	0.79	0.71	0.58	0.56	0.54		Based on NOI acres
832	Sq. Yd.	Winter Seeding and Mulching	1.08	1.00	0.92	0.85	0.81		Based on NOI acres
832	Cu. Yd.	Construction Entrance						75.25	

[1] Add the following amount per cubic yard for the cost of Type C or D Rock materials.
[3] Add the amount for the appropriately sized surface dewatering device for sediment basin outlet.

Appendix F

BMP ROCK MATERIAL SCHEDULE

District [2]	Purchase & Delivered to Job		Produced on Job	
	Type C	Type D	Type C	Type D
1	$ 60.00	$ 58.00	$ 27.50	$ 27.50
2	$ 60.00	$ 58.00	$ 27.50	$ 27.50
3	$ 67.00	$ 65.00	$ 27.50	$ 27.50
4	$ 71.00	$ 68.00	$ 27.50	$ 27.50
5	$ 63.00	$ 60.00	$ 27.50	$ 27.50
6	$ 65.00	$ 63.00	$ 27.50	$ 27.50
7	$ 65.00	$ 63.00	$ 27.50	$ 27.50
8	$ 65.00	$ 63.00	$ 27.50	$ 27.50
9	$ 66.00	$ 65.00	$ 27.50	$ 27.50
10	$ 70.00	$ 68.00	$ 27.50	$ 27.50
11	$ 65.00	$ 63.00	$ 27.50	$ 27.50
12	$ 71.00	$ 68.00	$ 27.50	$ 27.50

[2] Based on the District in which the project is administered.

SEDIMENT BASIN SURFACE DEWATERING DEVICE

Device Size	Purchase & Delivered to Job
1 1/2”	$598.00
2”	$750.00
2 1/2”	$915.00
3”	$1,100.00
4”	$1,590.00
5”	$2,375.00
6”	$3,650.00
8”	$6,000.00

[3] Surface dewatering device sized appropriately for sediment basin

Designer Note:

Provide this Supplemental Specification on all plans.

Under the Erosion Control heading, provide the following Reference Items:

> Item 832 Each Erosion Control - Provide an encumbered dollar value to be placed in the proposal for Item: 832 Each Erosion Control. This amount is for both the "quantity" and "total" fields. This amount should only be provided in the C2 Estimate, the Special Considerations Field on the Plan Package Submittal Form, and in the Plans.
>
> Example: $10,000 set up for Item 832 Each Erosion Control then 10,000 placed in the "quantity" and "total" fields.
>
> Item 832 Lump Sum Storm Water Pollution Prevention Plan - Provide a Lump Sum item for Storm Water Pollution Prevention Plan for projects that have 1 or more acres of estimated Total EDA.
>
> Item 832 Lump Sum Storm Water Pollution Prevention Inspections – Provide a Lump Sum item for Storm Water Pollution Prevention Inspections which includes the anticipated weekly, rainfall event and monthly inspections.
>
> Item 832 Lump Sum Storm Water Pollution Prevention Inspection Software services. Include costs for the SWPPPTrack software based on Contractor duration to achieve 70% permanent vegetation establishment.

For additional guidance on the NPDES process for ODOT projects, see the NPDES Construction Permit Implementation Plan flowchart on the Office of Hydraulic Engineering website.

For help estimating the encumbered dollar value for the Item 832 - Erosion Control, see the BMP Estimator on the DRRC website (*http://www.dot.state.oh.us/drrc/*).

Latest version of the OEPA NPDES Permit (OHC000005) combines Big Darby and Olentangy specific watershed requirements. Provide plan notes on the Preliminary SWPPP related to watershed specific requirements such as testing of stormwater discharge. Modify the Storm Water Pollution Prevent Inspection Lump Sum item of this specification to include all permit required stormwater testing.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 846
POLYMER MODIFIED ASPHALT EXPANSION JOINT SYSTEM

April 17, 2015

846.01 Description
846.02 Materials
846.03 Quality Control
846.04 Surface Preparation
846.05 Bridging Plate Installation
846.06 Binder Coat
846.07 Aggregate Preparation
846.08 Material Installation
846.09 Maintenance of Traffic
846.10 Method of Measurement
846.11 Basis of Payment

846.01 Description. This work consists of furnishing and installing polymer modified asphalt expansion joint systems at the locations shown in the plans.

846.02 Materials. Furnish materials conforming to:

Bridging Plate (1/4" x 8"):
Material ..... ASTM A-36, C&MS 106.09
Coating ..... C&MS 711.02
Locating Pins ..... 16d (or larger) galvanized common nail
Binder ..... ASTM D6297, Table 1
Aggregate:
Type ..... Crushed, Double washed and dried Granite, Basalt or Gabbro
Gradation ..... Manufacturer's Recommendation
Backer Rod:
Furnish closed cell foam expansion joint filler capable of withstanding placement temperature of the binder.

The Department will prequalify joint systems by the binder manufacturer.

Furnish the polymer modified expansion joint binder according to the Department's Qualified Products List (QPL) maintained by the Department Office of Materials Management. Prior to beginning work on the joint system, provide the Engineer certified test data of the polymer modified expansion joint binder batch supplied ensuring compliance with all material requirements.

846.03 Quality Control. At least 7 days before work begins, submit to the Engineer a detailed installation plan along with a letter from the joint manufacturer stating that the submitted installation plan is acceptable. The installation plan shall include, but is not limited to, the following information:

A. Minimum labor requirements
B. Equipment listing
C. Weather restrictions
D. Removal methods
E. Surface preparation requirements including measures necessary to address water seepage; bridging plate leveling; cleaning and drying
F. Bridging plate installation include whether locating pins are necessary and specify maximum gap width without backer rod
G. Binder coat quality control measures
H. Aggregate preparation quality control measures
I. Material installation including material proportioning and mixing requirements; minimum/maximum lift thickness; placement and finishing methods; compaction requirements; and quality control measures
J. Quality control checklist

For items E, F, G and I above, include illustrative photographic examples of acceptable work as well as illustrative photographic examples of issues to avoid that can lead to unacceptable work. For unacceptable work examples, provide descriptions of avoidance measures.

Quality control measures shall include testing equipment and frequency of measurements.

The contractor shall submit a completed quality control checklist and installation documentation to the Engineer immediately following completion of each joint installation. The checklist shall include the date and time when the joint installation began; weather conditions; and all QC measurements taken along with the time of each measurement. The installation documentation shall include photo documentation of the joint width and midpoint depth dimensions at each end of the joint prior to the binder coat as well as documentation of issues that arise during work (attach photographs if available) and steps taken to resolve each issue. The checklist shall be signed by the contractor's employee responsible for supervision of the joint installation.

The Engineer may conduct supplementary sampling and testing of the polymer modified expansion joint binder. If required, provide sample with project number, date, time, location, manufacturer and lot number of the adhesive.

846.04 Surface Preparation. After all paving operations are complete, saw cut full depth of any asphalt overlay or no less than two inches deep for monolithic concrete and twenty inches wide centered over the joint opening. Remove all material, including water-proofing material between the transverse saw cuts. For cuts in monolithic concrete, abrasive blast clean the entire cutout area to remove contaminants and loose aggregates. Thoroughly clean and dry exposed concrete, steel and cut surfaces using compressed air and a hot compressed air (HCA) lance as specified in the installation plan.

If there is an interruption due to weather or other causes, repeat the operation with the HCA

lance immediately before the binder coat operation.

Repair deteriorated joint substrate to the Engineer's satisfaction.

846.05 Bridging Plate Installation. Fill expansion gaps exceeding the maximum size specified in the installation plan with an appropriately sized backer rod. Place backer rod ⅛" to 1⅛" below the top of the expansion gap. Fill the gap above the backer rod with binder, and spread a 10" wide uniform layer of binder centered over the surface area in the bottom of the cutout.

Center the ¼" x 8" steel bridging plate over the expansion joint and bed into the hot binder. Butt joint the bridging plates to accommodate the entire joint length. Seal butt joints with hot binder. If the installation plan requires locating pins, drill ⅛" diameter holes in the center of the joint spaced at 1-ft maximum along the entire length of the joint and install locating pins.

846.06 Binder Coat. Seal all exposed surfaces of the joint with binder. Pour the hot binder over the floor area of the joint and spread to coat all exposed surfaces to the minimum thickness specified in the installation plan. Maintain the binder temperature as specified in the installation plan during application. Heat the binder in a double jacketed oil melter equipped with a continuous agitation system, temperature controls and calibrated thermometer.

Provide a system for accurately measuring the weights of the binder and aggregate.

846.07 Aggregate Preparation. Heat the aggregate to the manufacturer's recommended temperature range in a rotating drum mixer using an HCA lance or a pressure air injection torch (PAT).

846.08 Material Installation. Mix, place and finish the aggregate/binder material according to the installation plan.

Broadcast fine dry aggregate over the hot binder surface to eliminate material tracking as specified in the installation plan.

846.09 Maintenance of Traffic. If necessary to facilitate traffic maintenance, install the joint in two partial width phases. During the second phase of construction, remove a minimum of 2" of the previously installed joint at the phase line. Schedule all operations so that all lanes can be opened to traffic according to the project requirements.

846.10 Method of Measurement. The Department will measure these joints to the nearest cubic foot. The Department will determine the quantity by calculations from field dimensions or by plan dimensions if photo documentation of the joint dimensions, 846.03, is not provided.

846.11 Basis of Payment. The Department will pay for repair of deteriorated substrate as Extra Work according to 109.05 when pay items for this work are not included in the Contract. The Department will pay for accepted quantities completed in place at the contract price as follows:

Item	Unit	Description
846	Cubic Foot	Polymer Modified Asphalt Expansion Joint System

Designer Note:
The plans shall show a plan view and cross-section of each polymer modified asphalt expansion joint location on the bridge. The plan view shall provide the station of the joint centerline at the centerline of construction, skew angle and dimension its length as measured along the centerline of the joint. The cross-section shall dimension the width and thickness of the joint, width of the expansion gap and other significant joint details.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 874
LONGITUDINAL JOINT PREPARATION

April 17, 2020

874.01 Description
874.02 Materials
874.03 Equipment
874.04 Construction
874.05 Acceptance
874.06 Method of Measurement
874.07 Basis of Payment

874.01 Description. This work consists of preparing an asphalt concrete surface course cold, centerline, longitudinal paving joint prior to placing the adjacent asphalt lane using one of the methods described in 874.04. The Contractor may choose method 1 or method 2. Use only one method per paving route.

874.02 Materials. Furnish materials conforming to the applicable specifications based on the method selected.

874.03 Equipment. Provide equipment based on the method selected.

A. Method 1. Use either a minimum 10-inch (250 mm) diameter cutting wheel attached to self-propelled equipment, or planing equipment conforming to C&MS Item 254 *Pavement Planing.*

Use equipment conforming to Supplemental Specification 875 *Longitudinal Joint Adhesive*.

B. Method 2. Use equipment conforming to Supplemental Specification 872 *Void Reducing Asphalt Membrane*.

874.04 Construction. Ensure the asphalt concrete surface course cold longitudinal joint is properly constructed so that the completed joint is offset from the centerline according to BP-3.1.

A. Method 1. Remove a minimum of 3 inches (75 mm) width from the first pass of the entire length of the asphalt concrete surface course. Trim the face of the cold longitudinal joint to a vertical face without damaging, chipping, or spalling the remaining asphalt mat, either at the joint or the pavement surface below the joint. Provide a straight longitudinal joint using a string line or other controls as a point of reference. Prior to removal, mark the removal area at a minimum of 5-foot (1.5 m) intervals and obtain the Engineer's approval

Place longitudinal joint adhesive according to Supplemental Specification 875 *Longitudinal Joint Adhesive*.

B. Method 2. Place VRAM material according to Supplemental Specification 872 *Void Reducing Asphalt Membrane*.

874.05 Acceptance.

Furnish material certifications, field sampling, and application rate verification based on the method selected.

874.06 Method of Measurement. The Department will measure Longitudinal Joint Preparation by the linear foot or mile (meter or kilometer) completed and accepted.

874.07 Basis of Payment. When using Method 1, include the cost of furnishing, placing, and removing 3 inches (75 mm) of asphalt; and furnishing and placing SS 875 Longitudinal Joint Adhesive in the contract unit price for Longitudinal Joint Preparation. When using Method 2, include the cost of furnishing and placing SS 872 Void Reducing Asphalt Membrane in the contract unit price for Longitudinal Joint Preparation. The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
874	Foot or Mile (Meter or Kilometer)	Longitudinal Joint Preparation

Designer Notes:

This specification is to be used with asphalt concrete surface courses on projects where centerline rumble stripes are specified.

Do not calculate or include any pay quantity for asphalt that may be removed with Method 1. Ensure typical sections are coordinated with BP-3.1, TC-64.10 and this specification.

Ensure Supplemental Specifications 872 and 875 are referenced on the plan title sheet. Do not include any pay item quantities for 872 and 875 associated with this specification.

Contact the offices of Construction Administration or Pavement Engineering with questions on the use of this specification.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENT SPECIFICATION 875
LONGITUDINAL JOINT ADHESIVE

January 18, 2019

875.01 Description
875.02 Materials
875.03 Equipment
875.04 Placement
875.05 Quality Control
875.06 Method of Measurement
875.07 Basis of Payment

875.01 Description. This work consists of furnishing and installing a hot applied asphaltic joint adhesive on cold longitudinal construction joints in asphalt concrete pavements.

875.02 Materials. Use hot applied asphaltic joint adhesive meeting the following requirements:

Test	Description	Requirement
ASTM D 3236	Brookfield Viscosity @ 400°F (205°C)	4,000 - 10,000 CP
ASTM D 5329	Cone Penetration @ 77°F (25°C)	60-100 dmm
ASTM D 5329	Flow @ 140°F (60°C)	5 mm Max.
ASTM D 5329	Resilience @ 77°F (25°C)	30% Min.
ASTM D 113	Ductility @ 77°F (25°C)	30 cm Min.
ASTM D 113	Ductility @ 39.2°F (4°C)	30 cm Min.
ASTM D 5329	Tensile Adhesion @ 77°F (25°C)	500% Min.
AASHTO T 53	Softening Point	170°F Min.
ASTM D 5329	Asphalt Compatibility	Pass

Furnish hot applied asphaltic joint adhesive according to the Department's TE-24.

Submit a copy of the manufacturer's recommendations to the project for heating, re-heating, and applying the joint adhesive material.

Do not remove the joint adhesive from the package until immediately before it is placed in the melter. Joint adhesive boxes must be clearly marked with the name of the manufacturer, the brand name of the adhesive, the manufacturer's batch and lot number, the application/pour temperature, and the safe heating temperature. Feed additional material into the melter at a rate equal to the rate of material used.

Verify the pouring temperature of the joint adhesive at least once per hour at the point of discharge. Stop production if the adhesive falls below the recommended application/pour temperature. When the temperature of the adhesive exceeds the maximum safe heating temperature, stop production, empty the melter, and dispose of that adhesive in an environmentally safe method. No payment will be made for this material or its disposal.

Do not mix in the kettle or melter different brands or different types of adhesives even if they meet the specification requirements.

875.03 Equipment. Equipment used in the performance of this work is subject to the Engineer's approval. Heat the adhesive in a kettle or melter constructed as a double boiler, with the space between the inner and outer shells filled with oil or other heat-transfer fluid. Provide a pressure feed wand application system. Provide positive temperature control and mechanical agitation.

875.04 Placement. Ensure the face of the longitudinal joint is clean, dry, and free from debris before the joint adhesive is applied. Apply the joint adhesive material to the entire face of the surface course of asphalt concrete pavement where an adjacent asphalt concrete pavement surface will be constructed. Apply at a recommended thickness of 0.125" (3.2 mm). The use of an application shoe attached to the end of application wand is required. Apply the joint adhesive in front of the paving operation. If the adhesive is tracked by construction vehicles, repair the damaged area and restrict traffic from driving on the adhesive.

875.05 Quality Control. Acceptance of the joint adhesive material will be based on TE-24 approval. The Engineer may conduct supplementary sampling and testing of the adhesive material. If required, label two (2) metal, friction top quart cans sampling containers with project number, date, time, location, manufacturer and lot number of the adhesive.

875.06 Method of Measurement. The Department will measure the joint adhesive material by the number of pounds (kilograms) completed and accepted in place.

875.07 Basis of Payment.
The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
875	Pounds (Kilogram)	Longitudinal Joint Adhesive

Designer Notes:

Recommended rates of material to be used on longitudinal joints on plans for quantity calculations.

Material quantities:
For 2 inch thick pavements, apply at a rate of 1 pound per 2 feet.
For 1.75 inch thick pavements, apply at a rate of 1 pound per 3 feet.
For 1.5 inch thick pavements, apply at a rate of 1 pound per 4 feet.
For 1.25 inch thick pavements, apply at a rate of 1 pound per 5 feet.
For 1 inch thick pavements, apply at a rate of 1 pound per 6 feet.
For 0.75 inch thick pavements, apply at a rate of 1 pound per 7 feet.

This specification is to be used for surface courses only.

Do not include this as a pay item with asphalt concrete using SS 806 or 447 acceptance. For projects with multiple locations/roadways using different acceptance methods, this item may be specified as a pay item on the locations/roadways NOT using SS 806 or 447 acceptance.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 895
MANUFACTURED WATER QUALITY STRUCTURE

April 18, 2014

895.01 Description
895.02 Materials
895.03 Installation
895.04 Installation plan
895.05 Method of Measurement
895.06 Basis of Payment

895.01 Description. This work consists of constructing a precast water quality structure, a reinforced concrete slab as required by the installation plan, manholes as required by the installation plan, and all necessary conduit connections. Use all suitable materials in the work. Alternatively legally use, recycle, or dispose of all excavated material according to C&MS 105.16 and 105.17.

895.02 Materials. Furnish materials conforming to:

Epoxy Reinforcing Steel ..... C&MS 509
Precast Water Quality Structure ..... SS 995

Furnish a precast water quality structure that is on file with the Office of Materials Management.

The Contractor may furnish a manufactured water quality structure with a larger treatment capacity at no additional cost to the Department if the larger manufactured water quality structure can be constructed within the reserved area provided in the plans.

895.03 Installation. Install the precast water quality structure according to the Manufacturer's recommendations within the delineated footprint shown in the plans. Construct a reinforced concrete slab conforming to C&MS 511 as required in the installation plan. Construct all manholes conforming to C&MS 611. Construct all manholes within the delineated footprint shown in the plans at the location and elevation shown in the installation plan.

A manufactured water quality structure installation drawing may require low strength mortar backfill according to Item 613, Type 3. Refer to the manufacturer's installation drawings on file at the Office of Materials Management to determine if low strength mortar backfill is required. Any low strength mortar backfill required is incidental to the cost of the manufactured water quality structure. Any manufacturer installation requirements are furnished at no additional cost to the Department.

Construct all necessary conduit connections as shown in the installation plan using a Type B conduit conforming to C&MS 611.08, unless otherwise specified.

895.04 Installation plan. Prior to shipping each precast water quality structure to the project, furnish a copy of the installation plan to the project. Provide the installation plan on 8.5 × 11-inch (216 × 292 mm) sheets. The installation plan includes the following:

A. All material specifications.

B. The Manufacturer's recommended installation procedures.

C. Plan view of water quality structure, reinforced concrete slab, additional manholes, and the conduit connections to the manholes. Include the delineated footprint as shown in the plans along with the storm sewer and the provided manhole with diversion weir labeled by others.

D. Elevation view of precast water quality structure, reinforced concrete slab, additional manholes, and the conduit connections to the manholes.

E. All dimensions. Manhole dimensions shown in the installation plan that differ from the manhole dimensions in the plans Ensure manholes conform to C&MS 611.

F. Volume of storm water required to be pumped out of the precast water quality structure for routine maintenance.

G. Structural design loads including the dead load and live load.

H. Structural calculations for the reinforced concrete slab if utilized.

895.05 Method of Measurement. The Department will measure manufactured water quality structures by the number of each in place (including all manholes), completed and accepted.

A single manhole is provided in the plans for the water quality system. If an additional manhole is provided, the size of the manholes may be reduced per the manufacturer. There is no Item cost change for this structure change.

895.06 Basis of Payment. The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
895	Each	Manufactured Water Quality Structure, Type ___.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENTAL SPECIFICATION 921
ARROW BOARD

April 20, 2012

921.01 Description. This Supplemental Specification sets forth the requirements for Arrow Boards.

921.02 Materials. The Arrow Board shall consist of the following components: flasher panel, lamps, controls, power supply and mounting.

Furnish materials according to the Department's Approved List.

A. Flasher Panel. The flasher panel shall be of corrosion resistant metal construction of adequate design and strength. The panel shall be finished flat black. The panel type shall be one of the three below.

Panel Type	Minimum Size	Minimum Number of Elements
A	48 x 24 in (1200 x 600 mm)	12
B	60 x 30 in (1500 x 750 mm)	13
C	96 x 48 in (2400 x 1200 mm)	15

The Arrow Board shall be designed for operation in 100% humidity and temperatures from -20°F to +130°F (-29°C to +54°C).

B. Lamps. The lamps shall be LED. The lamp shall be fitted with a 360° hood at least 5" (125 mm) long.

Color output of light shall be amber.

The lamps shall be securely mounted and positioned in the panel perpendicular to the panel face and oriented so that the lamp location lug (on the back of the lamp) is on the horizontal center line through the lens.

The lamps shall be wired in circuits that can be switched to display any one of the following messages: left arrow, right arrow, left and right, caution bar, and corner caution.

C. Controls. Each Arrow Board shall contain a flasher control and a dimmer control unit housed in a cabinet which can be locked.

1. **Flasher Control.** The flash rate for the sign panel shall be 25 to 40 flashes per minute. The flasher shall not cause electromagnetic interference. The lamps shall have a minimum "on time" of 50% and a maximum of 66%.

2. **Dimmer Control.** Lamp intensity shall be variable by means of a photoelectrically controlled circuit which shall reduce lamp output during low ambient light conditions. Lamp intensity shall be at the nighttime level whenever the ambient illumination is in or below the range of 2 foot-candle (21 lux) to 5 foot-candle (54 lux) and shall be at daytime level when ambient illumination is in or above the range of 5 foot-candle (54 lux) to 10 foot-candle (108 lux). If controls provide for continuous adjustment of lamp intensity with respect to ambient illumination, then lamp intensity shall increase linearly from nighttime intensity at 5 foot-candle (54 lux) to daytime intensity at 3250 foot-candle (35,000 lux). A time delay shall be built into the control to prevent false operation due to light flashes. The photoelectric control shall contain a switch which shall override the photoelectric control.

D. Power Supply. Battery and solar/battery units shall have a no-charge-life of not less than 15 days. No-charge-life is the number of consecutive days that the system can continue to function (double arrow mode, normal dimming during 12 hour night, full output during 12 hour day) starting with a full battery charge and with no additional charge provided by the solar cells.

E. Mounting. The Arrow Board may be trailer or vehicle mounted or mounted on a rigid supporting device, behind barrier wall, suitable for maintaining it in the designated position. Each of the mounting methods shall be suitably stable such as to prevent movement due to high winds or passage of large vehicles.

When a trailer is used, construction shall be such as to transport the Arrow Board and appurtenances adequately and legally as well as support them properly during operation. The trailer shall be equipped with devices which shall provide leveling and stability during operation.

Minimum Arrow Board mounting height shall be 7 feet (2.1 m) above the pavement surface (measured to the bottom of the panel), except on vehicle-mounted panels, which should be as high as practical.

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION

SUPPLEMENT 1055
ASPHALT MAT DENSITY BY GAUGE TESTING

October 19, 2018

1055.01 General
1055.02 Equipment and Operation
1055.03 Minimum Density Target Determination
1055.04 Testing Procedures
1055.05 Reporting
1055.06 Failure to Follow Requirements

Appendix A Operation of Density Gauges
Appendix B Nuclear Density Gauge Calibration
Appendix C TE- Min Density Target Nuclear
Appendix D TE- Min Density Target Elec Gauge
Appendix E TE- Mat Density QCQA

1055.01 General. This supplement defines equipment, procedures and reporting methods for asphalt mat density testing and acceptance. The Field Quality Control Supervisor (FQCS) must maintain a copy of this specification at the paving site. Use the density gauge equipment and quality control (QC) procedures below to determine the density of an asphalt mat. The reporting method defined below creates an all-inclusive document for both quality control and quality assurance (QA) testing by the Contractor and Department.

The FQCS is the Contractors representative on site responsible to obtain and control density as defined below by being proactive in using available methods, materials or equipment to do so. Achieving the minimum density target as quickly as possible upon project start and then controlling density according to the below methods is the goal of this specification. Lack of proactiveness may be placing asphalt not achieving requirements with no attempt at changes in methods, materials or equipment. Failure to proactively implement methods, materials and equipment to quickly obtain and control density as intended in this specification may mean an application of 1055.06.

Do not determine and do not enter a gauge offset into a gauge control panel or use an existing offset of any kind. If an offset is present in the gauge that alters actual gauge readings all data collected will be rejected and acceptance for the project will be according to 446 as outlined in 1055.06.

1055.02 Equipment and Operation. Use a nuclear density gauge in the Backscatter Method meeting the requirements of ASTM D 2950 or a Pavement Quality Indicator (PQI) Model 300, Model 301 or Model 380 manufactured by TransTec Systems.

Nuclear density gauge operation – When performing tests operate the gauge using 1 minute wet density readings. Do not alter the test time or number of readings at a test location. Take readings where the pavement surface is flat and no surface moisture is evident.

Assure nuclear gauges were calibrated in the past two years. Maintain a copy of the calibration sheet with each nuclear gauge. Standardize nuclear gauges using the procedure in Appendix B. Ensure the standard count is within 2% of the most recent calibration or replace the gauge. Document the count and difference on the forms **TE -Min Density Target Nuclear, Appendix C and TE-Mat Density QCQA, Appendix E.**

PQI electronic density gauge operation – When performing tests set the device in the single reading and shallow penetration modes. A density measurement will consist of the average of five readings taken in accordance with the reading pattern as described in Appendix A. Take readings where the pavement surface is flat and no surface moisture is evident.

Verify the PQI 300, 301 gauge operation daily using the PQI test block. Follow the manufacturer instructions to establish an upper and lower limit at job start as a baseline verification. Ensure each day's verification result is within the upper and lower limits of the baseline verification. Document the verification limits and verification on the forms **TE-Min Density Target Elec Gauge, Appendix D and TE-Mat Density QCQA, Appendix E.**

Verify the PQI 380 gauge operation daily using the Standardization plate issued with the gauge. Follow the Manufacturer's instructions for performing the standardization. Ensure each day's standardization result is within the limits established by the manufacturer and published on the calibration documents. Document each day's standardization result and limits on the **TE forms Min Density Target Elec Gauge, Appendix D and Mat Density QCQA, Appendix E.**

1055.03 Minimum Density Target Determination.

Nuclear density gauge – Determine a minimum density target in the first four hours of production or when a mix change necessitates a target density change. Calculate a minimum density target from the gauge test unit weights and the percent density of companion cores obtained from the same test locations as the gauge and Contractor tested according to Supplement 1036. Determine the minimum density target using a gauge reading and companion core result from each of a minimum of 3 separate locations. Re-establish the minimum density target if the difference between the daily gauge calibration standardization count and the most recent calibration count values exceed 2% or if a different nuclear gauge is to be used.

Do not determine and do not enter a gauge offset into a gauge control panel or use an existing offset of any kind. Instead, record actual gauge readings on form **TE – Min Density Target Nuclear, Appendix C** and perform form required calculations. If an offset is present in the gauge that alters actual gauge readings all data collected will be rejected and acceptance for the project

will be according to 446 as outlined in 1055.06. Present the gauge to Department personnel daily to confirm to them no offset is present.

PQI electronic density gauge – Determine a minimum density target in the first four hours of production or when a mix change necessitates a target density change. Calculate a minimum density target from the gauge test unit weights and the percent density of companion cores obtained at the same test locations as the gauge and Contractor tested according to Supplement 1036. Determine the minimum density target using gauge readings and a companion core result from each of a minimum of 5 separate locations. Re-establish the minimum density target if the day's gauge verification result is not within the upper and lower limits or if a different electronic gauge is to be used.

Do not determine and do not enter a gauge offset into a gauge control panel or use an existing offset of any kind. Instead, record actual gauge readings on form **TE – Min Density Target Electronic Gauge, Appendix D** and perform form required calculations. If an offset is present in the gauge that alters actual gauge readings all data collected will be rejected and acceptance for the project will be according to 446 as outlined in 1055.06. Present the gauge to Department personnel daily to confirm to them no offset is present.

1055.04 Testing Procedures. Perform QC testing to maintain mat density between 93.0 and 96.5 percent. For QC results outside these limits immediately adjust compaction and/or the mix and immediately retest until the target is achieved. Stop placement if signs of flushing are occurring or if excess aggregate breakage is occurring. Maintain adequate compaction and verify by QC tests as follows:

A. For a different JMF re-do the startup procedure.

B. If mix properties change, are out of specification or plant problems occur re-do the startup procedure after problems are resolved and record results on the given forms.

Areas missed due to a gauge failure or other inability to obtain required QC tests must be tested for QC and QA according to the below procedures when equipment is available.

Startup - At the start of production, immediately determine the maximum achievable density by taking gauge measurements in a single location under multiple rollers and rolling passes. Ensure basic compaction practices such as proper mix temperatures, rollers tight to the paver and adequate number of rollers vs. paver speed are followed. Take measurements as frequently as possible to determine the maximum achievable density. Stop compacting if mat distress is evident. Correlate the final gauge readings with cores taken according to 1055.03 and tested immediately.

Maintain the maximum achievable density by the same compaction practices until the minimum density target is determined. Determine the minimum density target according to 1055.03 using the JMF Maximum Specific Gravity (MSG) until an actual test MSG is available. When an actual test MSG is available recalculate the density of each previous core and report the new densities and adjusted minimum density target on the required forms. Do not determine and

do not enter a gauge offset into a gauge control panel or use an existing offset of any kind. If an offset is present in the gauge that alters actual gauge readings all data collected will be rejected and acceptance for the project will be according to 446 as outlined in 1055.06.

Use plant MSG results even if any plant QC tests have an "out of specification" situation. Re-do the startup procedure when "in specification" test MSG results are achieved. If core results are below 93.0 percent adjust the mix or compaction as necessary and allowable per specification and repeat the startup procedure.

If a project includes 448.03 Density, acceptance will include any density deductions according to Supplement 1055.04.

Quality Control Testing - Use the minimum density target as a guide to maintain mat density above 93.0 percent in QC. Place a label on the pavement at each required test location. The Contractor is expected to perform more QC tests than required but only record required QC tests. Record all required tests and locations on the required form. Take the first required QC test at a location of approximately 1000 feet (300 meters) and one test at each location of approximately every 1000 feet (300 meters) thereafter. Sequentially alternate the transverse location of the required test at each 1000 foot (300 meters) location by starting at the left side of the mat for test one, middle for test two and right for test three and then repeat accordingly for additional locations. Take right and left tests centering the gauge at one foot (0.3 meters) from the mat edge Adjust compaction as needed to obtain the desired target unit weight at each test location and retest with the gauge to verify it is achieved.

Quality Assurance Testing – Quality assurance testing will begin after the first production day, regardless the status of achieving the minimum density target. Present the gauge to Department personnel before beginning QA tests each day to confirm to them no offset is present. A minimum of once in each production day or night the Department will randomly select two locations for QA testing. One location will be at a location previously tested and marked in QC testing. The other random location will be on the mat after the first 500 feet (150 meters) of that day. The Department will only select QA test locations within the traffic control zone. The QC technician will perform the testing in the presence of Department personnel. Perform three gauge tests (right, center, left) at each Department selected QA test location, average the three test readings and calculate the average percent density. Take right and left tests centering the gauge at one foot (0.3 meters) from the mat edge. Perform QA testing in the travel lanes only. Department personnel will place their initials on the QC form, Appendix E, beside data tested in their presence.

Each QA test will represent one half (1/2) days production. If only one of the two daily QA average densities is below 92.0 percent but above 91.0 percent do nothing. If one of the two daily QA average densities is below 91.0 percent use Table 1055.04-1 to determine the percent deduction pay adjustment due to density for that one half (1/2) days production.

Table 1055.04-1

Density (%)	Payment Deduction
90.0 to 90.9	5%
89.0 to 89.9	15%
88.0 to 88.9	30%
Less than 88.0	remove

If both QA average densities are below 92.0 percent use Table 1055.04-2 to determine the percent deduction pay adjustment due to density for each one half (1/2) days production.

Table 1055.04-2

Density (%)	Payment Deduction
91.0 to 91.9	5%
90.0 to 90.9	10%
89.0 to 89.9	15%
88.0 to 88.9	30%
Less than 88.0	remove

1055.05 Reporting. Use form **TE Mat Density QC QA**, **Appendix E,** for reporting results, whether as part of startup, QC by the Contractor or QA tests selected by Department personnel. Use forms **TE Min Density Target Nuclear**, **Appendix C**, or **TE Min Density Elec Gauge**, **Appendix D** for determining the minimum density target. Verbally report QC test results to Department personnel (when available) and the Contractor FQCS. Give a copy of all reports to the Project Engineer and fax or email copies to District Testing no later than the workday following the production day of the material represented by the report.

1055.06 Failure to Follow Requirements. Should the District determine that requirements of this specification are not being followed as intended, a gauge offset was used in density determinations, or that actual density of the mat is predominantly not as reported acceptance of the mat will revert to 446 requirements (without incentive payment). The project Field Quality Control Supervisor approval may be revoked should the District and Quality Control Qualification Committee (QCQC) of 403 determine that requirements of this specification are not being followed. QC requirements of Supplement 1055 are still required. The Department will perform the testing of the cores and assess the Contractor liquidated damages of two hundred and fifty dollars ($250) for each lot tested.

Appendix A
Operation of Density Gauges

PQI300, 301 Electro-magnetic Density Gauge Testing

Preparation Pick five locations on the asphalt that are dry.

Readings

A. Turn the PQI300, 301 on. Select the type of pavement you will be calibrating the PQI300, 301 from the menu choices. A "B", "I" or "T" will be displayed with in [ ].

B. Choose #2 (run) from the startup menu.

C. Using the "B" key, press the key until "Single Mode" appears on the screen.

D. Using the "F" key, press it to select shallow or deep penetration mode. An S or D will be displayed within brackets [ ].

E. Place the PQI300, 301 in the first location on the asphalt mat. Using a crayon marker draw a circle around the PQI300, 301. The round sensor plate may be used as a guide. Press the ENT key, (DO NOT TOUCH THE PQI) and wait for a reading to complete. Record the density reading.

HINT: Better readings are taken if no hands or objects are in contact with the PQI300, 301.

F. Move the PQI approximately 2 inches up and to the right on the outside of the circle. Consider this position as the 2 o'clock location. Press the ENT key to take another reading and record it in the table given in the back of this manual.

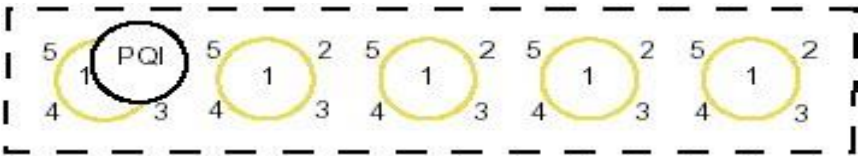


Figure A PQI Measurement Pattern

G. Move the PQI300, 301 clockwise around the marked circle to about the 4 o'clock position. Press the ENT key to take another reading and record it in the table.

H. Continue to move the PQI300, 301 in clockwise steps around the marked circle stopping at the 8 o'clock and 10 o'clock positions to take and record density readings. Following the pattern in Fig. A, move the PQI300, 301 to the next circle location, record a density reading in the center and at each clock position, in turn, until the table is complete.

PQI 380 Electro-magnetic Density Gauge Testing

Preparation Pick five locations on the asphalt mat that are dry.

Readings

A. Turn on the PQI380. Press the "Start PQI" button.
B. Select "Mix"
C. Enter your specific mix information in one of the available memory slots.
D. When all information is programmed, select "Back" and then "Control Menu".
E. From the Control Menu, select "Modes"
F. Select "Single" to set the gauge to Single reading mode. G. Select "Control Menu" to return to the Control Menu
H. Select "GO" to start measurements.
I. Place the PQI380 in the first location on the Asphalt mat. Using a crayon marker draw a circle around the PQI380. The round sensor plate may be used as a guide. Press the "Measure" button, (DO NOT TOUCH THE PQI) and wait for a reading to complete. Record the density reading.

HINT: Better readings are taken if no hands or objects are in contact with the PQI380.

J. Move the PQI380 approximately 2 inches up and to the right on the outside of the circle. Consider this position as the 2 o'clock location. Press the "Measure" button to take another reading and record it in the table given in the back of this manual.

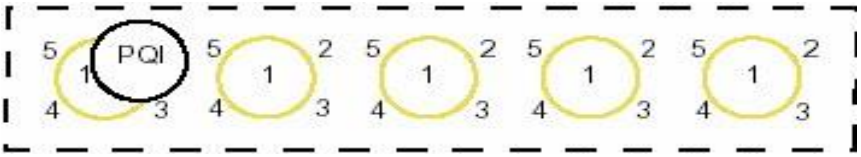


Figure B PQI Measurement Pattern

K. Move the PQI380 clockwise around the marked circle to about the 4 o'clock position.
L. Press the "Measure" button to take another reading and record it in the table.
M. Continue to move the PQI380 in clockwise steps around the marked circle stopping at the 8 o'clock and 10 o'clock positions to take and record density readings. Following the pattern in Fig. B, move the PQI380 to the next circle location, record a density reading in the center and at each clock position, in turn, until the table is complete.

Appendix B
Nuclear Density Gauge Calibration

Take a standard count daily, to compensate for the source decay and to check proper operation of the gauge.

Place the reference standard block on a dry, flat surface of asphalt. The location should be at least 10 feet from any building or vertical structure and 33 feet from any other nuclear gauge or radioactive source. Ensure that the top surface of the reference standard block and bottom of the gauge are clean of debris. Place the gauge between the grooves on the reference standard block. Place the source rod on your left and the right side of the gauge against the metal butt plate on the block. Ensure that the source rod is in the SAFE position.

Take the standard count and ensure it is within 2 percent of the calibration. Record results on all forms where required. Run standardization at a four minute count.

Appendix C

TE- Min Density Target Nuclear

MINIMUM DENSITY TARGET REPORT: Nuclear Gauge

Project: _____ Route: _____

Location: _____ Date: _____ Day #: _____

Mix Type: _____ JMF #: _____ Plant #: _____ District: _____

FQCS: _____ Density Technician: _____

MSG (F): _____ Weather & Temperature: _____

( ) Day ( ) Night

Gauge # / Model #: _____ Number of Lifts: _____

Daily Standard Count: _____ Calibration Std. Count / % Diff: _____

Nuclear Gauge Readings (PCF) Gauge Offset Set to Zero					
Location	1	2	3	Average	
PCF					(a)

Core Density Test Results (see TE-199 for detail)					
Location	1	2	3	Average	
% Density					(b)

Apply the following to obtain the nuclear gauge Minimum Density Target:

Minimum Density Target (PCF) = 93 x Gauge Reading Average PCF / Average % Density of cores

Minimum Density Target = 93 x _____ / _____ = _____ PCF

(a) (b) (c)

Remarks: _____

_____

_____

Test conducted by: _____ Date: _____

Appendix D

TE- Min Density Target Elec Gauge

MINIMUM DENSITY TARGET REPORT: Electro-Mag Gauge

Project: _____ Route: _____

Location: _____ Date: _____ Day #: _____

Mix Type: _____ JMF #: _____ Plant #: _____ District: _____

FQCS: _____ Density Technician: _____

MSG (F): _____ Weather & Temperature: _____

( ) Day ( ) Night

Gauge # / Model #: _____ Upper/lower verification limit: _____ / _____

Electro-Mag Gauge Readings (PCF) Gauge Offset Set to Zero					
Location	1	2	3	4	5
Center					
2 o'clock					
4 o'clock					
8 o'clock					
10 o'clock					
Location Average					
Overall Avg:		(a)			

Core Density Test Results (see TE-199 for detail)					
Location	1	2	3	4	5
% Density					
Average:		(b)			

Apply the following to obtain the nuclear gauge Minimum Density Target:

Minimum Density Target (PCF) = 93 x Gauge Reading Average PCF / Average % Density of cores

Minimum Density Target = 93 x _____ / _____ = _____ PCF

(a) (b) (c)

Remarks: _____

_____

_____

Test conducted by: _____ Date: _____

Appendix E

TE- Mat Density QCQA

DAILY MAT DENSITY QCQA REPORT

Project: _____ Route: _____

Location: _____ Date: _____ Day #: _____ Page_____of_____

Mix Type: _____ JMF #:_____ Plant #: _____ District: _____

FQCS: _____ Field Technician: _____

Gauge #/model Weather/Temperature: _____

Daily Standard Count (nuclear): _____ Calibration Std. Count / % Diff. _____

Daily Verification Result (elec.) _____ Upper/lower verification limit _____/_____

Minimum Density Target (**c**) _____ PCF

Gauge Readings (Contractor QC) **** Use a zero offset when providing gauge readings ****

#	Longitudinal Location	Transverse Location (circle)	Actual Gauge Reading (**d**), pcf	% Density = **d**/**c** x 93 (1055.04 target range 93.0-96.5)
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		
		L C R		

ODOT QA TESTS		**PCFs L C R AVG**	**% Density***	**Offset Verified Zero (Y/N)**	**ODOT Initials**
		/ / /			
		/ / /			

* Avg. Gauge PCF / Minimum Density Target PCF x 93 = % Density

Tests performed by: _____ Date Submitted: _____

SECTION 400

PROPOSAL NOTES

MODIFICATIONS TO ITEM 499 CONCRETE - GENERAL

499.01 Description.

These modifications pertain to the proportioning requirements for Portland concrete mix designs, mixing, and controls of Portland cement concrete for all pavement (255, 305, 451 or 452), Class QC2 concrete approach slabs (526), Class QC1, QC2, QC3 or QC4 concrete for structures (511), Class QC MISC concrete for slope and channel protection (601) and concrete masonry (602), Class QC1 or QC MISC concrete sidewalk (608) and concrete curb (609) used for this project.

499.02 Materials.

Use of Slag Modified Portland Cement (701.09) or blended cement is **not** permitted.

Use of concrete made with Recycled Concrete Aggregate (RCA) (ODOT Supplement 1117) is **not** permitted.

499.03 Concrete Mix Designs.

For integral concrete curb items (609), a concrete mix design matching that of the corresponding concrete pavement items (305, 451 or 452) is required.

For integral concrete curb items (609) and for concrete pavement items (255, 305, 451 or 452), Class QC MS and Class QC FS mix designs having an aggregate gradation per 1126.02(A) (QC 1P mix design) of ODOT Supplement 1126 are required.

For concrete walk items (608) and non-integral concrete curb items (609), Class QC MISC mix designs using an aggregate gradation per 1126.02(A) (QC1 mix design) of ODOT Supplement 1126 is required.

499.04 Adjustments and Controls.

Assure/certify that the requirements of 499.04(D) are strictly followed without exceeding the maximum water – cementitious ratio of the JMF (499.04(F)).

499.07 Batch Plant Tickets.

In addition to all requirements of 499.07, the batch plant tickets must distinctly reflect all requirements stated above in sections 499.02, 499.03 and 499.04.

ITEM 613 – LOW STRENGTH MORTAR BACKFILL (TYPE 1), AS PER PLAN

All applicable provisions of Item 613, as set forth in the Construction and Material Specifications, shall apply except as modified herein.

613.01 Description.

This work consists of placing a low strength mortar backfill around conduits and at other locations in lieu of structural backfill material (703.11) and non-structural backfill material (203.02.R). Perform the work for this item according to Items 611 and 499, except as modified in Item 613 and/or below.

613.02 Materials.

The use of spent foundry sand is strictly prohibited.

613.08 Placing Mortar.

Unless otherwise directed by the Engineer, the limits of permissible low strength mortar placement are from one (1) foot above the conduit to the top of the trench at the proposed subgrade for Type A and B conduits or one (1) foot below finished grade for Type C conduits. Structural backfill material (703.11), limited to crushed carbonate stone (CCS), shall be provided for the bedding and backfill up to one (1) foot above the conduit, placed and compacted per 611.06.

The Engineer may direct that the low strength mortar not be placed within three (3) feet of the subgrade elevation (per 613.08) if, in his/her opinion, placement above this limit would/could affect or otherwise contaminate the subdrainage/underdrain collection system. In this case, the remaining structural backfill material (703.11) or non-structural backfill material (203.02.R) placed above this limit shall be per plan requirements.

613.09 Method of Measurement.

No separate measurement will be made for the low strength mortar used to backfill Item 611 conduits and Item 611 structures.

613.10 Basis of Payment.

Payment for furnishing and placing the low strength mortar backfill shall be included in the cost of the associated 611 Item.

ITEM 512 – SEALING CONCRETE BRIDGE DECKS WITH HMWM RESIN, AS PER PLAN

All work and material shall be in accordance with Sections 512.02 and 512.04 of the ODOT CMS except as follows:

The Cuyahoga County Department of Public Works' Bridge Inspection & Maintenance (BI&M) Section shall be notified at least 72 hours prior to any deck surface preparation work commencing. The BI&M Section may elect to have its representative on site to witness the surface preparation and/or the deck sealing operations.

The material used for treating the concrete bridge decks shall be:

WABO ConTrete 2P-RC
Watson Bowman Acme Corp.
95 Pineview Drive
Amherst, New York 14228
Phone: (716) 691-7566
(800) 677-4922

DURAGUARD 401
ChemMasters, Inc.
300 Edwards Street
Madison, Ohio 44057-3112
Phone: (440) 428-2105

Or approved Equal.

The entire sealed area of the bridge deck shall have sand broadcast by mechanical means at the rate specified in Section 512.04(C) of the ODOT CMS. The sand shall meet the quality requirements of Section 703 of the ODOT CMS except that **no steel slag aggregate or equal per CMS 703.01(E) shall be allowed in place of the sand**.

Payment for this item shall be made under:

Item	Unit	Description
512	SY	Sealing Concrete Bridge Decks with HMWM Resin, As Per Plan

ITEM 512 – TREATING CONCRETE BRIDGE DECKS WITH GRAVITY-FED RESIN, AS PER PLAN

All work and material shall be in accordance with Sections 512.02 and 512.06 of the ODOT CMS except as modified below.

The material used for treating the concrete bridge decks shall be:

MARK 135 SAFE-T-SEAL
Poly-Carb
33095 Bainbridge Road
Solon, Ohio 44139
Phone: (440) 248-1223

DURAGUARD HM SEALER
ChemMasters, Inc.
300 Edwards Street
Madison, Ohio 44057-3112
Phone: (440) 428-2105

DURAL 335
The Euclid Chemical Company
19218 Redwood Road
Cleveland, Ohio 44110
Phone: (800) 321-7628
(216) 531-9222

SIKADUR 55 SLV
Sika Corporation
201 Polito Avenue
Lyndhurst, NJ 07071
Phone: (800) 933-7452

The Cuyahoga County Department of Public Works' Bridge Inspection & Maintenance (BI&M) Section shall be notified at least 72 hours prior to any deck surface preparation work commencing. The BI&M Section may elect to have its representative on site to witness the surface preparation and/or the deck sealing operations.

No extra payment will be made for removal of existing pavement markings.

All expansion joints shall be masked during the application process.

The gravity-fed resin material shall be applied when the surface temperature of the concrete is at least 5°F above the dew point temperature and the ambient air temperature is between 40°F and 90°F.

It is recommended that the gravity-fed resin material be mixed in 5-gallon batches and applied manually with squeegees, brooms, etc. to assure the quality of the material and the thorough coverage of the deck surface.

The Contractor may also choose to mix and place the material with pressurized dispensing equipment. If so, the material must first be applied to a discrete test area on the bridge deck, such as in a berm, median or gutter, to demonstrate the application equipment, material coverage rates, drying times, final cure, etc. The specific location and application time for the test area shall be proposed at least 3 days prior to applying the resin material. A manufacturer's representative for the resin material and the application equipment must be present to familiarize the Contractor and Engineer with the material and the set-up and use of the equipment. The representatives shall direct at least one complete test area of the bridge deck (minimum of 50 square feet) and must be present

during the application of the material and the drying/curing of the test area. After conducting the test to the satisfaction of the Engineer, the representatives for the resin material and the application equipment shall provide written statements confirming that the equipment and material meet their specifications, the application equipment is in proper working condition and that the placed resin material has cured properly. Any significant changes with the material and/or the equipment that are recommended by the representatives for any unanticipated situations prior to or during the actual treatment of the bridge deck must be approved by the Engineer prior to the adoption of such changes.

No standing water shall be present during application of the gravity-fed resin.

The entire sealed area of the bridge deck shall have sand broadcast by mechanical means at the rate specified in Section 512.06(C) of the ODOT CMS. The sand shall meet the quality requirements of Section 703 of the ODOT CMS except that **no steel slag aggregate or equal per CMS 703.01(E) shall be allowed in place of the sand**. The sand shall be a uniformly graded aggregate conforming to the following gradation limits:

Sieve size	Total % Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90 to 100
No. 20 (850 µm)	5 to 15
No. 50 (300 µm)	0 to 5

It is the intention of this specification to allow the use of commercially available blast sands applied by common lawn broadcast type seeder/spreader. Sand shall be placed between 45 to 75 minutes behind the resin-spreading front depending on air and surface temperatures. The Contractor shall provide timely and sufficient broadcast of the aggregate to ensure the skid resistance on the deck does not drop below 40 after curing of the resin. If the surface contains large, deep cracks, the low viscosity liquid could run completely through the concrete slab. In these areas, a second coat will be required after the first coat has started to cure.

Before the resin hardens, imperfections or spalls with standing liquid shall be filled with commercial quality concrete or sandblast sand and finished to a uniform surface. The sand shall have a maximum moisture content of 0.5 of the percent of absorption when treated in accordance to California Test 226.

Cleaning and flushing of equipment, tools, etc. shall be done with an appropriate solvent, as approved by the Engineer, in such a manner as to minimize personal and environmental hazards.

Payment for this item as described above shall be made under:

Item	Unit	Description
512	SY	Treating Concrete Bridge Decks with Gravity-Fed Resin, As Per Plan

ITEM SPECIAL – SEALING, MISC.: ELASTOMERIC PROTECTIVE AND DECORATIVE CONCRETE COATING

Description. This work consists of applying an elastomeric protective and decorative coating on existing and new concrete surface areas after the concrete has cured and repairs completed and cured. Apply the coating to the locations shown and/or described in the plans.

Materials. The materials used for coating the concrete surfaces shall be:

1. TAMMOLASTIC with TAMMS H/P PRIMER as manufactured by:
   The Euclid Chemical Company
   19218 Redwood Road
   Cleveland, Ohio 44110
   Phone: (800) 321-7628
   (216) 531-9222

2. CONFLEX XL HIGH BUILD COATING with LOXON ACRYLIC PRIMER as manufactured by:

   The Sherwin-Williams Company
   Commercial West
   11722 Bellaire Road
   Cleveland, Ohio 44135
   Phone: (216) 252-3133

3. COLORLASTIC ELASTOMERIC COATING with SAFESEAL ACRYLIC PRIMER as manufactured by:

   ChemMasters, Inc.
   300 Edwards Street
   Madison, Ohio 44057-3112
   Phone: (440) 428-2105

4. Approved Equal.

All materials used on this project shall be from the same coating manufacturer. They shall be delivered to the site in the coating manufacturer's sealed containers bearing the coating manufacturer's labels identifying type, color and batch number.

Each coat shall be of a contrasting color. The final topcoat color shall be as specified in the project plans. **If no color is specified, then the final color of the topcoat shall be Federal Standard Color No. 36521 (pearl)** unless specified otherwise by the Engineer.

Equipment. Use application equipment recommended by the coating manufacturer. Use spray equipment, tanks, hoses, brooms, rollers, coaters, squeegees, brushes, etc., that are clean, free of foreign matter, oil residue and water.

Mixing. Mix the coating according to the manufacturer's recommended procedures. Furnish the Engineer with the manufacturer's mixing and application instructions. Do not mix or apply the coating until the manufacturer's written recommendations are supplied to the Engineer. Mix materials to a uniform consistency and maintain during application.

Storage. Store all coating components in tightly sealed containers, in a dry location, and as recommended by the manufacturer. Deliver unopened drums or containers of the coating or coating components to the job site with the manufacturer's numbered seal intact.

Surface Condition. Apply coatings to surfaces that are dry, free from dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials. Repair any structurally unsound surfaces, weak sections or spalled areas before applying any coating.

Air dry concrete surfaces for at least five (5) days after completion of the required curing. Air-dry any cavities that require grout filling and curing for five (5) days. Do not apply the coating until the air-drying is complete.

Coat accelerated cured precast concrete after it has attained the required 28-day strength and after any cavities that require grout filling have been filled, cured and air-dried for five (5) days.

Surface Preparation. Remove dust, dirt, oil, wax, curing compounds, efflorescence, laitance, existing coatings and other foreign materials from surfaces to be coated. Use chemicals or other cleaning compounds if removal requires their use, but only use products approved by the coating manufacturer. Furnish the Engineer with documentation of the coating manufacturer's approval. The Engineer shall inspect all surfaces for areas of insufficient preparation. Such areas must be sufficiently prepared prior to the application of the coating. Apply the coating within 48 hours of the Engineer's acceptance of the final surface preparation work.

Install suitable traps, filters, drip pans and other separation devices in the cleaning equipment so that oil and other foreign material are not deposited on the concrete surfaces to be coated.

Use the following cleaning methods depending on the concrete surface type:

1. New water cured exposed concrete surfaces
    - Water blast at 5,000 psi minimum

2. New, liquid membrane cured, exposed concrete surfaces
    a. Water blast at 5,000 psi minimum, or
    b. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surfaces and opened pores. Remove all membrane-curing compound.

3. Exposed surfaces of new prestressed concrete box beams
    a. Clean with high pressure hot water or steam jenny, or
    b. Water blast at 5,000 psi minimum, or
    c. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surfaces and opened pores.

4. Existing concrete surfaces
    a. Water blast at 5,000 psi minimum, or
    b. Sandblast, followed by air brooming or power sweeping, to remove dust and sand from the surfaces and opened pores.
    c. When existing epoxy-urethane coatings exist on the substrate, a sandblast followed by air brooming or power sweeping MUST be utilized to attain the desired surface and open the pores.

Application and Coverage. All traces of abrasive and other debris shall be removed prior to any coating operation. All coating applications shall be applied according to the coating manufacturer's recommended mode of application and coverage rates. **Two (2) coats of the topcoat material shall be placed on the concrete surfaces.**

Use primer and elastomeric coating from the same manufacturer. Do not thin or dilute the coating material. All concrete must have cured at least 28 days prior to application of the coating. Only apply materials when the surface temperature of the concrete is between 50°F and 90°F, is at least 5°F above the dew point temperature and when the ambient air temperature is forecast to remain below 90°F within 12 hours after application. Do not apply if weather conditions will not permit complete drying of the coating material before rain or dew occurs.

Establish a nine (9) square foot minimum test section for the coating for which the project's visual effects of the coating application at the required coverage rate will be demonstrated. Obtain approval of the Engineer for the finish, water repellency, coverage and color before proceeding with the remaining work. Retain the test section sample for the purpose of quality control through completion of the work.

Appearance. Uniform appearance and the final color shall visually match the test section. Re-coating, removal and re-application or other methods recommended by the manufacturer will be required as directed by the Engineer to correct the final appearance. Sags and runs in the coating will not be accepted. Refer to SSPC PA 1 for details on workmanship.

Protection of Adjoining Surfaces and the Public. Protect the public during all operations, especially when applying sealer to the fascia or the underside portions of a bridge that spans an area used by the public.

During application of the coating, mask off, or use other means of protection, for surfaces not being coated. Protect asphalt and mastic type surfaces from spillage and heavy overspray. Protect nearby steel, aluminum, glass and other reflective surfaces when coating overspray could be deposited on those surfaces.

Environmental Requirements. Protect plants and vegetation from overspray by covering with drop cloths.

Safety Precautions. Follow precautions defined on the manufacturer's Material Safety Data Sheet (MSDS). Provide the Engineer a copy of the MSDS for information before any work commences.

Method of Measurement. The quantity will be the actual area in square yards of surfaces sealed.

Item	Unit	Description
Special (512 75500)	SY	Sealing, Misc.: Elastomeric Protective and Decorative Concrete Coating

ITEM 515 - HIGH EARLY STRENGTH KEYWAY GROUT FOR ADJACENT PRESTRESSED/POST-TENSIONED CONCRETE BOX BEAMS

The high early strength keyway grout, specified in Standard Drawing PSBD-2-07, sheet 1 of 4, Mortar Alternate 2, shall meet the requirements of this specification.

Provide certified test data according to Section 101.03 of the Cuyahoga County Engineer (CCE) General Provisions showing compliance with the requirements herein. Include manufacturer's mixing, installation, application, and curing requirements. If approved, the material shall be considered equal to those found on ODOT's Approved List (Qualified Products List) under 705.22.

Only use materials on ODOT's Approved List (Qualified Products List).

The approved grout shall meet the following requirements:

Minimum Compressive Strength ASTM C109 (modified) grout material only – no aggregate - at 72 ºF (22 ºC)

3-day	6,000 psi (41.4 MPa)
28-day	7,500 psi (51.7 MPa)

Minimum Flexural Strength ASTM C78 (modified) grout material only - no aggregate

1 day	500 psi (3.4 MPa)

Modulus of Elasticity. ASTM C469 (modified) grout material only - no aggregate - at 72 ºF (22 ºC)

4.5 to 5.5 x 10^6 psi (31,050 to 37,950 MPa)

Coefficient of Thermal Expansion. CRD-C 39-81

6.5 to 7.5 x 10^{-6} /ºF (11.7 to 13.5 x 10^{-6} /ºC)

Setting Times. Gilmore ASTM C266 (modified)

Initial	10 minutes minimum
Final	12 minutes minimum

Shrinkage. ASTM C157

Maximum = 0.025%

Flowability. Test according to ASTM C1437. The mix shall have a flow above 125 after 5 drops of the flow table in 3 seconds.

Aggregate. Maximum aggregate size shall not exceed 3/8".

Field Application

Approved high early strength keyway grout shall be delivered to the field as pre-packaged material requiring only the addition of water and aggregate. Follow manufacturer's instructions regarding when aggregate is needed and type and amount of aggregate to be used.

The procedures for grout mixing, installation, application and curing shall conform to the procedures submitted to the Laboratory. The grout manufacturer and/or Contractor shall furnish a copy of the approved grout installation procedure to the Project Engineer at least 3 days before installation of any grout.

REVISING HIGH STRENGTH BOLT REQUIREMENTS FROM ASTM 325 TO ASTM F3125

Replace all references in the Contract to ASTM A325 (ASTM A325M) with ASTM F3125 Grade A325 (A325M).

ITEM SPECIAL - PATCHING CONCRETE BRIDGE DECK OVERLAYS WITH MICRO-SILICA MODIFIED CONCRETE

A. Description. This item consists of furnishing the necessary labor, materials and equipment to repair concrete bridge deck overlays, including the removal of loose and unsound concrete, bituminous patches, surface preparation, bonding coat and the mixing, placing, finishing, curing compressive strength testing and sealing of all the patches as directed by the Engineer.

B. Removal of Unsound Concrete. The Engineer sounds the wearing surface and backwall tops and outline the areas to be removed. Sound the deck when it is sufficiently dry to permit detection of all areas of delamination. Saw the perimeter of all removal areas to a depth of 2 inches (50 mm) to produce a vertical or slightly undercut face. Use additional saw cuts to facilitate removal. Do not extend saw cuts beyond the limits of the patch. Do not allow cooling water from wet sawing and dust from dry sawing to contaminate the exposed patch holes. Remove all patches other than sound concrete and all obviously loose and disintegrated concrete. Remove the unsound concrete by chipping or hand dressing. Use chipping hammers that are not heavier than the nominal 35-pound (16 kg) class. Operate the chipping hammers at an angle of less than 45 degrees measured from the surface of the deck.

Remove concrete in a manner that prevents cutting, elongating or damaging reinforcing steel. Where the bond between the concrete and a primary reinforcing bar has been destroyed, or where more than one half of the periphery of such a bar has been exposed, remove the adjacent concrete to a depth that will provide a minimum 3/4-inch (20 mm) clearance around the bar except where other reinforcing bars make this impracticable. Adequately support and tie back into place reinforcement that has become loose.

C. Surface Preparation. Clean and then apply the bonding grout or the patching material. Thoroughly clean by abrasive blasting, followed by an air blast, the surface to be patched and the exposed reinforcing steel within 24 hours prior to patching. Use blasting abrasives containing 1% or less free silica shall. Use hand tools to remove scale from the reinforcing steel.

Prevent contamination of the area to be patched by construction equipment or from any other source by placement of a clean 4-mil polyethylene sheet (or any other covering as approved by the Engineer) on the surface of the deck following the air blast cleaning. Provide adequate supports for the concrete mixer where reinforcing steel is exposed, so that reinforcing steel and its bond with the concrete will not be damaged by the weight and movement of the concrete mixer or provide means to convey concrete from the mixer to the patch locations.

D. Materials, Mixing, Placing and Curing. Patch overlays with MSMC. Micro-Silica Modified Concrete (MSMC). Furnish materials conforming to the following:

Fine Aggregate (natural sand)	703.02 (A)
Coarse Aggregate (No. 8)	703.02 (B)
Portland Cement, Type 1	701.04 or 701.01
Water	499.02
Chemical Admixture	705.12, ASTM C 494, Type A or D
Air-Entraining Admixture	705.10

Superplasticizing Admixture ..... 705.12, ASTM C 494, Type F or G (High Range Water Reducer)
Curing Materials ..... 705.05 or 705.06, White Opaque
Micro-Silica Admixture 701.10

Adjust proportioning and all other required characteristics of the mix, e.g. air entrainment and slump, off the deck before placement of the patches begins. The MSMC mixture consists of a workable mixture of uniform composition and consistency with the following proportions:

Type of Coarse Aggregate	Coarse Aggregate lb (kg)	Fine Aggregate lb (kg)	Cement Content lb (kg)	Microsilica lb (kg)	Water-CM Ratio Maximum
Gravel	1520 (689)	1170 (530)	700 (318)	105 (48)	0.36
Limestone	1540 (698)	1170 (530)	700 (318)	105 (48)	0.36
Slag	1335 (605)	1170 (530)	700 (318)	105 (48)	0.36

* The specific gravities used for determining the above weights are: Natural Sand 2.62, Gravel 2.62, Limestone 2.65, Slag 2.30 and Micro-Silica 2.20.

Obtain a written statement from the manufacturer of the Micro-Silica admixture that he is satisfied with the compatibility of the combination of materials and the sequence in which they are combined. Supply a concrete that meets these specifications and provides the necessary workability, finishability and pumpability if needed. The incorporation of individually approved materials into the concrete will not necessarily result in an acceptable mix. Include all costs of the use of different chemical admixtures or aggregates under this item of work.

Do not exceed with deleterious material, one-half the requirement for superstructure aggregate and do not exceed sodium sulfate soundness loss that is specified for superstructure concrete in 703.02.

Correct the batch weights previously described to compensate for the moisture contained in the aggregate at the time of use. Use a chemical admixture (705.12, Type A or D). Limit the transit mixer charge to 3/4 of its rated capacity or 6 cubic yards, whichever is the smaller, unless the Engineer approves a larger size. Mix any admixture added after the initial mixing a minimum of 5 minutes at mixing speed. Maintain the slump range 6 +/- 2 inches (152 +/- 50 mm) after all components have been added. Maintain the air content from 8 +/- 2 percent at the point of discharge. “Retemper” the mix with the admixture if slump loss occurs after mixing. If the consistency of the charge after "retempering" is such as to cause segregation of the components, this will be cause for rejection of the load. Place the MSMC within the 90-minute limitation.

Mix the concrete in a central mixing plant or ready-mixed concrete truck capable of discharging concrete having a maximum water-cement ratio of 0.36.

Meet the requirements of 499.05 (B) for central mixing plants and ready-mixed concrete trucks. Introduce admixtures into the concrete in such a manner that will disperse it throughout the entire load. Meet the requirements of 499.05 (A) for batch plants. Do not exceed 90 minutes for the

maximum time required from start of mixing to completion of discharge of the concrete at the site of work.

Water cure the overlay patches as per CMS 511.14 method (A), using continuous sprinkling and no plastic sheeting, for a minimum of 24 hours followed by a membrane cure per CMS 511.14 Method (B).

Use an evaporation retardant and finishing air at the Contractor's option prior to the texturing operation. Use products specifically marketed for said use. (Plain water is not acceptable) Do not exceed the hourly surface evaporation rate as determined by Figure 1 ACI 308-81.

Spray an evaporation retardant over the textured area immediately after the texturing operation. Follow the manufacturer's recommendations for the application rate. Follow this operation with the wet burlap cure as closely as possible.

Supply a properly calibrated impact rebound hammer to verify that the patches have reached 2000 psi (13.8 MPa) compressive strength prior to opening to traffic. Place the MSMC patching material only when the local ambient temperature is above 45 ºF (8 ºC) and is forecast to remain above 45 ºF (8 ºC) for the curing period. Do not place the MSMC when rain is forecast within the intended period. Place the MSMC only if the patch surface evaporation rate, as affected by the ambient air temperature, concrete temperature, deck temperature, relative humidity and wind velocity, is 0.1 pound per square foot per hour or less. Determine and document the atmospheric conditions subject to verification by the Engineer.

Do not place MSMC if the ambient air temperature is 85 ºF (30 ºC) or higher or predicted to go above 85 ºF (30 ºC) during the patching procedure regardless of the surface evaporation rate. Do not permit traffic on the patches until the 24-hour water cure is completed and the 2000 psi (13.8 MPa) strength is obtained. Maintain the temperature at the patch surface above 35 ºF (2 ºC) until the curing period is completed.

Use Figure 1 ACI 308-81 to determine graphically the loss of surface moisture for the patches. Do not permit the temperature of the MSMC to exceed 90 º F (30 ºC) during placement. Cease all operations if rain occurs during placing of the material. Do not place MSMC patches after October 31 except by specific permission of the County.

Temporarily cover with wet burlap the work face of the placed patch material and any bonding grouted areas, during delays in the patch placement operations of more than 10 minutes. Install a bulkhead at the work face and terminate the placement operation if an excessive delay is anticipated. Do not place a patch adjacent to a previous patch that has cured for less than 24 hours unless otherwise authorized by the Engineer.

Take adequate precautions to protect the freshly placed MSMC from rain.

E. Lighting. Submit a plan that provides adequate lighting for work area if placement of the patches is to be made at night. Submit the plan at least 15 calendar days in advance to be

approved by the Engineer before concrete is placed. Direct the lights so that they do not affect or distract approaching traffic.

F. Screeding. Place, consolidate and finish the patching material to the adjacent grade. Level and consolidate with a mechanical vibrating screed patches exceeding 50 ft^2 (4.6 m^2). Hand vibrate and level with a straightedge smaller patches. Place the screed parallel to the bridge centerline so that the deck profile remains consistent with the worn surface.

Test the surface of the plastic concrete for trueness and for being flush with the edges of the adjacent surfaces by use of a straightedge. Place the straightedge parallel to the bridge centerline with the ends resting on the existing wearing surface adjacent to the patch and draw the straightedge across the patch. Correct any high or low areas exceeding 1/8 inch in 10 feet (3mm in 3m). Recheck the surface if any corrections are made.

G. Texturing. Texture in accordance with Section 451.10 of the CMS after the patches have been consolidated and finished.

H. Inspection and Sounding of Concrete Patches. Sound all patched areas after curing and before final acceptance. Remove and re-patch all delaminated areas according to this note. Seal all patches that are sound but show signs of cracking and seal with gravity fed resin the perimeter of all patches.

The Contractor is responsible for all sounding and replacement of rejected areas of which is included in the unit bid price for this item.

I. Method of Measurement. The County will measure the actual area in square yards of the exposed surface of all patches, irrespective of the depth of the patch, complete, in place and accepted.

J. Basis of Payment. The County will pay for accepted quantities at the contract price bid for:

Item	Unit	Description
Special	SY	Patching Concrete Bridge Deck Overlays with Micro-Silica Modified Concrete

ITEM SPECIAL - PATCHING CONCRETE BRIDGE DECKS

A. Description. This item consists of furnishing the necessary labor, materials and equipment to repair concrete bridge decks, including the removal of all loose and unsound concrete, bituminous patches, surface preparation, bonding coat and the mixing, placing, finishing and curing of the mortar or concrete patches.

B. Materials. Furnish materials conforming to the following requirements:

Fine aggregate (natural sand)	703.02
Coarse aggregate (No.8)	703.02
Portland cement	701.05
Quick Setting Concrete Mortar, Type 1 or 2	705.21
Air-entraining admixture	705.10
Curing materials - Type A or B Patches	705.07
Curing materials - Type C Patches	Mfgr's recommendations

C. Removal of Unsound Concrete. The Engineer shall sound the entire deck and outline the areas to be removed. Sound the deck when it is sufficiently dry to permit detection of all areas of delamination. Saw the perimeter of all removal areas to a depth of 1 inch (25 mm) to produce a vertical or slightly undercut face. Use additional saw cuts to facilitate removal, if necessary. Remove all unsound concrete including all patches other than sound Portland cement concrete, and all loose and disintegrated concrete. Remove the unsound concrete by chipping or hand dressing. Use chipping hammers that are not heavier than the nominal 35-pound (16 kg) class. Operate the chipping hammers at an angle of less than 45 degrees measured from the surface of the deck. Remove the concrete in a manner that prevents cutting, elongating or damaging reinforcing steel. Where the bond between the concrete and a primary reinforcing bar has been destroyed, or where more than one half of the periphery of such a bar has been exposed, remove the adjacent concrete to a depth that will provide a minimum 3/4-inch (19 mm) clearance around the bar except where other reinforcing bars make this impracticable. Adequately support and tie back into place reinforcement that has become loose. After completion of the secondary removal operations, the Engineer will re-sound the deck to ensure that only sound concrete remains. Minimize construction joints. Only place construction joints on the perimeter of the removal areas.

D. Surface Preparation. Clean and then apply the bonding grout and/or the patching material. Thoroughly clean by sandblasting followed by an air blast, the surface to be patched and the exposed reinforcing steel. Use hand tools to remove scale from the reinforcing steel. Keep the prepared surface dry for Type A and Type B patches and Type C patches which do not use water as the activator. Leave the prepared surface in the condition as recommended by the manufacturer for Type C patches that require water as the activator. Follow the manufacturer's recommendations for any additional surface preparation for the patching material that is used.

E. Bonding Grout. The grout for bonding Type A patches consists of equal parts by volume of Portland cement and sand, mixed with sufficient water to form a stiff slurry. Apply this slurry with a stiff brush or broom to the existing surface in a thin, uniform coating. Scrub the coating of grout onto the dry surface immediately before placing the concrete. Ensure that no

excess grout is permitted to collect in low spots. The grout is not to be permitted to dry before placing the new concrete. Paint thinned grout over all joints between the new existing concrete immediately after the finishing has been completed. Bond Type B and Type C patches according to the manufacturer's recommendations.

F. Patching. Place the mortar or concrete as Type A, B, or C.

1. **Type A.** The mixture consists of 1 part high-early-strength Portland cement, 1-1/2 parts fine aggregate and 1-1/2 parts coarse aggregate by volume. Add sufficient air-entraining agent to maintain an air content of 8 plus or minus 2 percent. Maintain the slump at the minimum practical for placing and at a maximum of 2 inches (50 mm). Mix the materials at the site. Ready-mixed concrete is not permitted. Place the mix in the area to be patched while the bonding grout is still wet, slightly overfilled and struck off with a vibrating screed drawn slowly across the area. Hand finish with a wood float to produce a tight, uniform surface.
2. **Type B.** Patching material consists of Quick Setting Concrete Mortar, Type 1 or 2, 705.21. Mix and place the mortar as per manufacturer's recommendations. Add coarse aggregate in accordance with the manufacturer's instructions when the depth of the patch exceeds 1 inch (25 mm).
3. **Type C.** Patching material consists of a blend of 705.21 Type 2 material and selected aggregates with an activator. Mix and place these materials as per manufacturer's recommendations. Add coarse aggregate in accordance with the manufacturer's instructions when the depth of the patch exceeds 1 inch (25 mm).

G. Curing. Cure Type A patches in accordance with 511.14, Method (A), for not less than 24 hours if membrane waterproofing is to be applied immediately. If not, use Method (A) for 48 hours, after which apply membrane curing material at a rate not less than one gallon per 200 square foot (1 L per 5 m^2). Remove membrane-curing material prior to placing waterproofing. Cure Type B and Type C patches in accordance with the manufacturer's recommendations.

H. Method of Measurement. The County will measure the actual area in square yards (square meters) of the exposed surface of all patches, irrespective of the depth of the patch, complete, in place and accepted.

I. Basis of Payment. The County will pay for accepted quantities at the contract price bid for:

Item	Unit	Description
Special	SY	Patching concrete bridge decks, Type _____.

SURFACE SMOOTHNESS FOR BRIDGES AND APPROACHES

DESCRIPTION

This note shall be included on all projects with new bridge decks and approach slabs and at least 100 feet of new approach pavement on each side of the approach slabs. This note shall also apply with lesser new approach pavement based on the approach pavement profile and existing conditions, or in areas with low ADT (ex. < 500) or with lower speed limits (ex. 25 mph), as determined by the Engineer.

For projects with new full depth cast-in-place concrete decks and slab superstructures, the surface smoothness requirements of C&MS 451.13 are modified as follows for bridge encounters defined as 25 feet of entry pavement, entry approach slab, bridge deck, exit approach slab and 25 feet of exit pavement including all joints.

MATERIALS AND EQUIPMENT

Provide smoothness measuring equipment conforming to Supplement 1058. Furnish ODOT's approval letter of the profiler and the operator to the Engineer prior to commencing work. The Engineer will verify the smoothness measuring equipment conforms to Supplement 1058. The Engineer will verify the profile operator's certification against the operator list posted on ODOT's Office of Construction Administration webpage. Furnish equipment meeting the requirements of C&MS 257.02 for performing corrective diamond grinding. The Engineer will complete the Smoothness Profiler Verification Report in Supplement 1058.

SMOOTHNESS MEASUREMENT

Collect surface smoothness measurements for both wheel paths in each proposed travel lane during one continuous pass. The wheel paths are located parallel to the centerline or baseline of the roadway or ramp and approximately 3.0 feet from the centerline of the lane, measured transversely in both directions. Start the profile measurement approximately 250 feet before the approach slab/pavement interface at the entry end and continue to approximately 250 feet after the approach slab/pavement interface at the exit end.

Notify the Engineer a minimum of 24 hours prior to surface smoothness measurements. Do not perform final measurements until all final wearing courses are in place within the bridge encounter lanes being measured and all concrete surfaces have reached specified curing and loading requirements. Place expansion joint material including polymer modified joint material, unarmored strip seals, unarmored expansion seals or similar material after completing corrective action. Place temporary material in lieu of the joint material for profile measurement until all corrective action is complete. Remove all dirt and debris from the surface of the travel lanes prior to performing the surface smoothness measurements. Provide permanent or temporary pavement markings for all travel lanes that are of sufficient size to be

visible during surface smoothness measurements. Ensure the path of the profiler is parallel to the lane centerline at all times during data collection.

Develop an International Roughness Index (IRI) according to ASTM E 1926 for the bridge encounter using a continuous 25 feet base length analysis for each wheel path. Submit two copies of the summary report from ProVAL conforming to Supplement 1112 and two electronic copies of all bridge encounter profiles in ProVAL compatible format to the Engineer.

Provide necessary traffic control and survey stationing for all surface smoothness measurements.

MANDATORY CORRECTIVE ACTION

The county will require corrective action where the Localized Roughness IRI (Refer to Supplement 1112 Appendix D for Definition) in any 25 feet segment of the bridge encounter exceeds 250 inches per mile, except on structures that include a steel armored expansion joint system where corrective action is required when the IRI exceeds 300 inches per mile. Perform corrective action to reduce the IRI for each corrected lane to 250 inches per mile or less for any 25 feet segment for a structure without a steel armor expansion joint system. For a structure that includes a steel armored expansion joint system, perform corrective action to reduce the IRI at the steel armor for each corrected lane to 300 inches per mile or less. Do not perform corrective diamond grinding within 1.5 feet of a steel armored expansion joint system installed prior to the corrective action. Do not exceed 0.5 inches of material removed by corrective diamond grinding without approval of the Engineer. If proposing diamond grinding exceeding 0.5 inches, use a pachometer or equivalent, capable of locating the nearest reinforcement, (i.e. size and location), accurate to within ± 0.1 inches. Provide cover readings within 6 inches of grinding locations exceeding 0.5 inches of removal depth.

Anytime PN 420 is used in conjunction with PN 555, the localized roughness criteria for the pavement beyond one foot of the approach slab will be governed by the criteria in PN 420.

If corrective action is required, develop a corrective action plan in accordance with Supplement 1112. Submit the corrective action plan to the Engineer at least 7 days before beginning corrective action. Do not begin corrective action until receiving the Engineer's acceptance of the corrective action plan. The corrective action plan may include but is not limited to grinding, pavement removal and replacement or a combination of the two. Corrective action required to meet the maximum allowable IRI values that are performed after the contract completion date, will be a Punch List item in accordance with C&MS 109.12.B. Corrective action will not be assessed liquidated damages in C&MS 108.07 or similar contract disincentives. If correction action on the Punch List is not completed within a reasonable time, it will be subject to an assessment of fifty percent of liquidated damages in accordance with C&MS 109.12.B. Upon completion of the corrective action, re-measure surface smoothness according to this specification. Feather areas adjacent to ground areas to provide a smooth surface. Re-groove diamond ground surfaces according to 511.17 if the existing grooves are less than 0.08 inches deep at no additional cost to the project. Replace pavement markings and raised pavement markers according to the plans. All costs for corrective action will be the responsibility of the Contractor.

PAY ADJUSTMENTS

A lump sum pay adjustment will be made according to Table 1 (without steel armored expansion joint system) or Table 2 (with steel armored expansion joint system) below based on the localized roughness histogram analysis within PROVAL per Supplement 1112. Positive Pay adjustments will only be made on histogram bins (refer to Supplement 1112 for definition.) on pre-corrected profile data that is below 200 IRI. The positive pay adjustment will only be made if the final structure does not have any locations exceeding a localized roughness of 250 IRI post correction without steel armored expansion joint systems or a localized roughness of 300 IRI with steel armored expansion joint systems, even for histogram bins on pre-corrected profile data below 200. The negative pay adjustments will be based on post corrective data.

The county will not accept the Work for any part of the bridge with an IRI above 600 and consider the same as not in reasonably close conformance with the contract documents per C&MS 105.03. For surface smoothness above 600 IRI localized roughness, the Contactor must submit a corrective work plan per C&MS 501.05.C.

<table>
<tr><th colspan="4">Table 1 - Pay Adjustment – No Steel Armor Expansion Joint Systems</th></tr>
<tr><th>IRI</th><th>Approx. Area Under the Curve (AAUC)</th><th>Factored Bid Cost (FBC)</th><th>Pay Adjustment (PA)</th></tr>
<tr><td>IRI > 600</td><td colspan="3">Contractor submits corrective action plan.</td></tr>
<tr><td>550 < IRI ≤ 600</td><td>AAUC = -325 * $L_{550\text{-}600}$</td><td rowspan="3">FBC = BC/1000</td><td rowspan="8">PA = AAUC*FBC</td></tr>
<tr><td>500 < IRI ≤ 550</td><td>AAUC = -275 * $L_{500\text{-}550}$</td></tr>
<tr><td>450 < IRI ≤ 500</td><td>AAUC = -225 * $L_{450\text{-}500}$</td></tr>
<tr><td>400 < IRI ≤ 450</td><td>AAUC = -175 * $L_{400\text{-}450}$</td><td rowspan="4">FBC = BC/2000</td></tr>
<tr><td>350 < IRI ≤ 400</td><td>AAUC = -125 * $L_{350\text{-}400}$</td></tr>
<tr><td>300 < IRI ≤ 350</td><td>AAUC = -75* $L_{300\text{-}350}$</td></tr>
<tr><td>250 < IRI ≤ 300</td><td>AAUC = -25 * $L_{250\text{-}300}$</td></tr>
<tr><td>200 < IRI ≤ 250</td><td colspan="3">No Pay Adjustment</td></tr>
<tr><td>150 < IRI ≤ 200</td><td>AAUC = 25 * $L_{150\text{-}200}$</td><td rowspan="4">FBC = BC/4000</td><td rowspan="4">PA = AAUC*FBC</td></tr>
<tr><td>100 < IRI ≤ 150</td><td>AAUC = 75 * $L_{100\text{-}150}$</td></tr>
<tr><td>50 < IRI ≤ 100</td><td>AAUC = 125 * $L_{50\text{-}100}$</td></tr>
<tr><td>0 < IRI ≤ 50</td><td>AAUC = 175 * $L_{0\text{-}50}$</td></tr>
<tr><td colspan="4">Notes:
$L_{i\text{-}j}$ = Total length (ft) of encounter with i < IRI ≤ j (e.g. $L_{200\text{-}250}$ for 200 < IRI ≤ 250)
BC bridge decks = Unit Bid Cost ($/yd^3) of superstructure concrete deck</td></tr>
</table>

Table 2 – Pay Adjustment – with Steel Expansion Joint Systems			
IRI	**Approx. Area Under the Curve (AAUC)**	**Factored Bid Cost (FBC)**	**Pay Adjustment (PA)**
IRI > 600	**Contractor submits corrective action plan.**		
550 < IRI ≤ 600	**AAUC = -325 * $L_{550\text{-}600}$**	**FBC = BC/1000**	**PA = AAUC*FBC**
500 < IRI ≤ 550	**AAUC = -275 * $L_{500\text{-}550}$**		
450 < IRI ≤ 500	**AAUC = -225 * $L_{450\text{-}500}$**		
400 < IRI ≤ 450	**AAUC = -175 * $L_{400\text{-}450}$**	**FBC = BC/2000**	
350 < IRI ≤ 400	**AAUC = -125 * $L_{350\text{-}400}$**		
300 < IRI ≤ 350	**AAUC = -75* $L_{300\text{-}350}$**		
250 < IRI ≤ 300	**No Pay Adjustment**		
200 < IRI ≤ 250			
150 < IRI ≤ 200	**AAUC = 25 * $L_{150\text{-}200}$**	**FBC = BC/4000**	**PA = AAUC*FBC**
100 < IRI ≤ 150	**AAUC = 75 * $L_{100\text{-}150}$**		
50 < IRI ≤ 100	**AAUC = 125 * $L_{50\text{-}100}$**		
0 < IRI ≤ 50	**AAUC = 175 * $L_{0\text{-}50}$**		
Notes:			
$L_{i\text{-}j}$ = Total length (ft) of encounter with i < IRI ≤ j (e.g. $L_{200\text{-}250}$ for 200 < IRI ≤ 250)			
BC bridge decks = Unit Bid Cost ($/yd^3) of superstructure concrete deck			

SURFACE SMOOTHNESS REQUIREMENTS FOR PAVEMENTS

DESCRIPTION: The surface tolerance specification requirements are modified as follows for all pavements of constant width with at least 1 centerline mile (1.6 km) of continuous paving. Short breaks in paving such as bridge decks, intersections, etc. are not considered breaks in continuous paving. Also included is pavement for ramps, acceleration lanes, and deceleration lanes greater than 0.5 miles (0.8 km) in length. Do not include pavement for turn lanes including center turn lanes, shoulders, crossovers, approach slabs, and bridge decks.

Roads with less than 1 centerline mile (1.6 km) of paving; ramps, acceleration lanes, and deceleration lanes less than 0.5 miles (0.8 km); and sections of undivided highways, as defined in this note, within corporation limits with posted speed limits less than 40 miles per hour require smoothness measurement and corrective action for all areas of localized roughness with an IRI in excess of 250 inches per mile (3.95 m/km) in 25 feet (7.6 m) only. Do not include pavement for turn lanes including center turn lanes, shoulders, crossovers, approach slabs, and bridge decks.
Areas not part of this specification are subject to the requirements of the original item(s) specified. If the pavement surface is Rubberized Open Graded Asphalt Friction Course (Supplemental Specification 803), this specification applies to the surface of the course immediately below and
references to the number of courses placed do not include the SS803
course.

MATERIALS AND EQUIPMENT: Provide smoothness measuring equipment conforming to Supplement 1058. Furnish the Department's approval letter of the profiler and the operator to the Engineer. The Engineer will verify the smoothness measuring equipment conforms to Supplement
1058. The Engineer will complete the Smoothness Profiler Verification Report found in Supplement 1058, Appendix A, to document profiler calibration prior to measurement. The Engineer will verify the profile operator's certification against the operator list posted on the Office of Technical Services webpage. Furnish equipment meeting the requirements of C&MS 257.02 for performing corrective diamond grinding.

SMOOTHNESS MEASUREMENT: Measure the pavement surface smoothness in both wheel paths. Wheel paths are located parallel to the centerline or baseline of the roadway or ramp and approximately 3.0 feet (1.0 m) from the centerline of the lane or ramp, measured transversely in both directions. Ensure the path of the profiler is parallel to the lane centerline at all times. Measure the entire length of pavement, event marking the profile runs such that profile data can later be identified when the profile sensor(s) is within 1.0 foot (0.3 m) of any existing pavement not constructed on the project, pressure relief joint, approach slab, or other non-pavement features (i.e. manholes, valve boxes). Remove any objects such as dirt, debris, curing covers, etc., prior to performing the surface smoothness measurements. Replace any

curing covers after the measurements are taken. Repair any membrane curing damaged during the measurements.

Do not perform any surface smoothness measurements until the pavement has cured sufficiently to allow measuring without damaging the pavement. When the pavement will not support the profiler on the next working day, notify the Engineer and inform the Engineer when the measurements will be taken. Provide the Engineer at least 24 hours' notice prior to performing any measurements. Do not take measurements until project site verification is demonstrated to the Engineer according to Supplement 1058.

Develop an International Roughness Index (IRI) according to ASTM E 1926 for each 0.1-mile (0.16 km) section. Submit two copies of the summary report from ProVAL conforming to Supplement 1110 and two electronic copies of all longitudinal pavement profiles in ProVAL compatible format to the Engineer. The Engineer will submit one copy of the summary report and one electronic copy of the profiles to the Office of Technical Services.

Provide necessary traffic control and survey stationing for all surface smoothness measurements.

MANDATORY CORRECTIVE ACTION: Perform corrective action for the applicable surface type as required. Do not include pavement within 40 feet (12.2 m) of a bridge deck or approach slab in any 0.1-mile (0.16 km) section evaluated for pay adjustment. Measure and evaluate these
40-foot (12.2 m) sections for localized roughness corrections. Provide a list of all mandatory corrective action locations, with station, lane, and proposed corrections to the Engineer for approval. Do not perform any corrective actions without approval of the Engineer.

Asphalt Concrete Surface: Classify asphalt pavement areas into one of the following types based on the work performed as part of the Project.

Type A: Asphalt pavement specified as at least two uniform courses with the total thickness placed greater than or equal to 3 inches (75 mm).

Type B: Asphalt pavement specified as either: a) at least one uniform course with the total thickness placed less than 3 inches (75 mm) and including Item 254 or SS897 planing prior to resurfacing, or b) at least two uniform courses with the total thickness less than 3 inches (75 mm) without including Item 254 or SS897 planing prior to resurfacing.

Type C: Asphalt pavement specified as a single uniform course not meeting the criteria of Type B. The uniform course may be placed on a non-uniform leveling course.

TABLE 420-1 ASPHALT CONCRETE PAVEMENT CLASS CRITERIA				
	Divided Highways*		**Undivided Highways***	
Pavement Class	Corrective Action	Pay Adjustment Schedule (Table 420-3)	Corrective Action	Pay Adjustment Schedule (Table 420-3)
Type A [≥ 3in. + 2-course]	[1],[5]	A	[2],[5]	A
Type B [< 3in. + Milling] or [< 3in. + 2-course]	[1],[5]	A	[3],[5]	A
Type C [< 3in. + 1-course]	[2],[5]	A	[4]	B

* Divided highways have physical separation such as a grass median, raised concrete median, guardrail, or barrier between the two directions of travel. Highways with continuous two way left turn lanes are considered undivided. Undivided highways with short sections, less than 1000 feet (300 m), of physical separation are considered undivided for the entire length.

Corrective Action:

[1] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 160 inches per mile (2.53 m/km) in 25 feet (7.6 m).

[2] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 200 inches per mile (3.16 m/km) in 25 feet (7.6 m).

[3] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 225 inches per mile (3.55 m/km) in 25 feet (7.6 m).

[4] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 250 inches per mile (3.95 m/km) in 25 feet (7.6 m).

[5] Correct any 0.1-mile (0.16 km) sections having an IRI greater than 90 inches per mile (1.42 m/km).

Perform corrective action as required in Table 420-1 by removing and replacing to the depth necessary to correct the deviations or by diamond grinding. Use asphalt concrete meeting the contract requirements for the replacement work. Apply Item 407 Tack Coat prior to placing the surface course. The total amount of grinding is limited to no more than 5% by longitudinal length of the lane-miles (lane-km) eligible for a pay adjustment.

Re-measure each 0.1-mile (0.16 km) section where corrective action was performed to ensure compliance with Table 420-1.

If the final surface course is Item 803, seal any diamond ground areas with material meeting the requirements of 702.04 prior to placing the Item 803.

Portland Cement Concrete Surface: Classify pavement areas into one of the following types based on the work performed as part of the Project.

Type A: Concrete pavement with the total specified thickness greater than or equal to 8 inches (200 mm).

Type B: Concrete pavement with the total specified thickness greater than 6 inches (150 mm) and less than 8 inches (200 mm).

Type C: Concrete pavement with the total specified thickness less than or equal to 6 inches (150 mm).

TABLE 420-2 PORTLAND CEMENT CONCRETE PAVEMENT CLASS CRITERIA				
	Divided Highways*		**Undivided Highways***	
Pavement Class	Corrective Action	Pay Adjustment Schedule (Table 420-3)	Corrective Action	Pay Adjustment Schedule (Table 420-3)
Type A [≥ 8in.]	[1],[5]	A	[1],[5]	A
Type B [> 6 in. & < 8in.]	[1],[5]	A	[2],[5]	A
Type C [< = 6 in.]	[2],[5]	A	[3]	B

* Divided highways have physical separation such as a grass median, raised concrete median, guardrail, or barrier between the two directions of travel. Highways with continuous two way left turn lanes are considered undivided. Undivided highways with short sections, less than 1000 feet (300 m), of physical separation are considered undivided for the entire length.

Corrective action:

[1] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 160 inches per mile (2.53 m/km) in 25 feet (7.6 m).

[2] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 200 inches per mile (3.16 m/km) in 25 feet (7.6 m).

[3] Correct all areas of localized roughness having deviations, high or low points, with an IRI in excess of 225 inches per mile (3.55 m/km) in 25 feet (7.6 m).

[5] Correct any 0.1-mile (0.16 km) sections having an IRI greater than 90 inches per mile (1.42 m/km).

Perform corrective action as required in Table 420-2 by diamond grinding or removing and replacing. Use Portland cement concrete meeting the contract requirements for the replacement work.

Re-measure each 0.1-mile (0.16 km) section where corrective action was performed to ensure compliance with Table 420-2.

Complete all corrective action prior to determination of pavement thickness. If corrective action is required, the surface texture after diamond grinding is acceptable and no additional texturing is required.

Asphalt and Portland Cement Concrete Surfaces: If corrective action is required, develop a corrective action plan at least 7 days before beginning corrective action. Include in the plan identification and detailed location descriptions of all localized and lot violations and proposed corrective action. Do not begin corrective action until receiving the Engineer's acceptance of the corrective action plan. The corrective action plan is limited to grinding, pavement removal and replacement or a combination of the two. Upon completion of the corrective action, re-measure surface smoothness according to this specification. In the event the Contractor is not able to correct the surface smoothness to meet the Specification, the DCA may establish a deduction to the Contract in accordance with section 105.03 of the C&MS.

EXEMPTED CORRECTIONS: Required corrective action resulting from contract requirements for maintaining traffic and construction joints placed at the beginning and end of each work period are considered exempted corrections. The contractor will identify and define all exempted correction locations. Exempted corrections for maintaining traffic occur primarily at ramps or other access points where paving must be suspended. Required corrective action due to material availability, weather, or any other reason not listed above, is not considered an exempted correction. No exempted corrections for maintaining traffic exist on projects where the maintenance of traffic plan does not interfere with paving operations. Perform exempted corrections according to the requirements for mandatory corrective action.

METHOD OF MEASUREMENT: Determine the IRI for each lane for each 0.1-mile (0.16 km) section of paving. The IRI for a 0.1-mile (0.16 km) section is the average of the IRI of the two-wheel paths.

PAY ADJUSTMENTS: A lump sum pay adjustment will be made according to the following schedule and calculations for each lane for each 0.1-mile (0.16 km) section. Payment will be based on a 12-foot (3.7 m) lane width, regardless of lane width. Pay adjustments are based on the weighted average bid unit cost per square yard for the section multiplied by the pay factor as determined in Table 420-3. Pavement thickness is the total thickness of asphalt concrete, Portland cement concrete, or both placed as part of the contract and does not include any SS803 course, free draining base, aggregate base, stabilized subgrade, etc.

TABLE 420-3 PAY SCHEDULE			
SCHEDULE A		**SCHEDULE B**	
IRI	**PAY ADJUSTMENT**	**IRI**	**PAY ADJUSTMENT**
Inches per mile per 0.1 mile section (m/km per 0.16 km section)	**Percentage of Unit Cost (PUC) (%)**	**Inches per mile per 0.1 mile section (m/km per 0.16 km section)**	**Percentage of Unit Cost (PUC) (%)**
35 (0.55) or less	4	45 (0.71) or less	4
Over 35 to 50 (0.55 to 0.79)	(50 - IRI) * (4/15)	Over 45 to 60 (0.71 to 0.95)	(60 - IRI) * (4/15)
Over 50 to 70 (0.79 to 1.10)	0	Over 60 (0.95)	0
Over 70 to 90 (1.10 to 1.42)	- (IRI - 70) * (6/20)		
Over 90 (1.42)	(1)		

(1) Corrective action required

Asphalt Pavements:

$$WUC = \frac{(t_1 \times u_1) + (t_2 \times u_2) + (t_3 \times u_3) \ldots}{36}$$

Where: WUC = *weighted unit cost ($/SY).*

t = *lift thickness (in.).*

u = *bid unit cost ($/CY).*

Concrete Pavements:

WUC = *bid unit cost ($/SY)*

Pay Adjustment *(PA)*:

$$PA = WUC \times 704 \times PUC$$

Where: WUC = *weighted unit cost ($/SY).*

PUC = *percentage of unit cost from Table 420-3, expressed as a decimal.*

Pay adjustments will be based on the measured IRI after any mandatory corrective action however no incentive will be paid for any 0.1-mile (0.16 km) section where mandatory corrective action was performed regardless of the resulting IRI.

One-tenth mile (0.16 km) sections with exempted corrections only are eligible for incentive pay based on IRI measurements taken after completion of the exempted corrections.

At the Contractor's option, corrective action may be performed on any section with an IRI greater than 70 inches per mile (1.10 m/km) to reduce or eliminate the negative pay adjustment however, no incentive will be paid regardless of the resulting IRI. As an option the Department may allow corrective action, in the form of diamond grinding, Item 254, or SS897 pavement planing, to improve the profile on any course prior to the surface course. If the final course is Item 803 do not perform corrective action on the Item 803. Only diamond grinding may be performed on the course immediately below Item 803.

Negative pay adjustments apply to sections with mandatory corrective action and exempted corrections.

No payment will be made for any 0.1-mile (0.16 km) section subject to Schedule A that has an IRI greater than 90 inches per mile (1.42 m/km) until corrective action has been completed and the IRI has been reduced to less than 90 inches per mile (1.42 m/km).

BASIS OF PAYMENT: Include the cost of all labor, equipment, and materials necessary to meet this specification in the contract unit or lump sum price for the applicable pavement items.

STEEL PRICE ADJUSTMENT

A. General: This note applies to all projects expected to be constructed over a time period of more than one year and that require steel products listed in Table B-1 below.

This proposal note acknowledges fluctuations in the cost of manufactured steel used in the materials defined below and placed as part of the applicable construction work in the form of a pay adjustment. This proposal note will be used in bidding documents, including design-build projects only for as long as the price of the steel products set out below are subject to volatile spikes as determined solely by the County.

These price adjustment provisions apply to items in the contract including any modified standard or non-standard item where the work to be performed involves the placement or installation of one or more of the steel products specified herein. The total price adjustment must be more than $400.

The State of Ohio Department of Transportation (ODOT) will post monthly adjustment indices for steel using data obtained in Table B-1.

For Category 1, Table B-1:

ODOT will post monthly adjustment indices (BI and MI) for wide flange steel beams plus, a scrap surcharge using data obtained from the steel producers listed.

http://www.stld-cci.com/

http://www.gerdauameristeel.com/products/mp/pl.cfm

http://www.nucoryamato.com/

For Category 2, Table B-1:

ODOT will post monthly adjustment indices (BI and MI) for steel using data obtained on the last Wednesday of the month from the American Metal Market (**AMM**), based on the price for Steel Plate, Cut-to-length as reported for National Mills.

B. Price Adjustment Criteria and Conditions: The BI monthly values apply to projects sold during the same month in which the data is posted. The MI monthly values apply to projects for which qualifying items are shipped from the mill during the same month in which the data is posted. Adjustments will be made to the contract for fluctuations in the cost of steel used in the manufacture of the primary components of only the steel products listed in Table B-1:

Product Relationship Table B-1	
Steel Product (Title)	**BI, MI**
Category 1: Structural Steel Members, Levels UF, 1, 2, and 3 Steel H-Piling	Average of lowest and highest 27" to 36" tall, 10"-12" wide flange beams, up to 256 lbs./ft., prices plus scrap surcharge from Nucor-Yamato, SDI, and Gerdau Ameristeel
Category 2: Structural Steel Members, Levels 4, 5, and 6 Stay-in-place steel casing (Piling & Caissons)	AMM Product Designation: Steel Plate, Cut-to-length (National Mills)

Nuts, bolts, rebar chairs, connecting bands and other miscellaneous hardware items shall not be included in the price adjustment. No other steel products shall be considered for a price adjustment.

Adjustments will only be made for fluctuations in the cost of the steel used in the above products as shipped from the producing mill. No adjustment will be made for changes in the cost of manufacturing, fabrication, shipping, storage, etc.

Adjustments may be positive, negative, or non-existent depending on the circumstances. Adjustments for the steel price will be calculated by the Engineer and processed by change order on the Contractor's progress estimate.

No steel price adjustments will be made for any products manufactured from steel having a mill shipping date prior to the letting date.

Furnish the following documentation for all Table B-1 steel products to be incorporated into the work. Submit all documentation to the Engineer prior to incorporation of the steel into the work. The County will withhold progress payments if the documentation is not provided and at the discretion of the Engineer, the work is allowed to proceed. Progress payments will be made upon receipt of the delinquent documentation. Submit separate documentation packages for each steel product in Table B-1 and for each quantity represented by items 2) c and d below. Label each documentation package with a unique number.

1) An affidavit signed by the Contractor, or Design-Build Team, (DBT) stating that the documentation provided is true and accurate.
2) Identification of the steel product subject to adjustment.
    a. Documentation package number: PN525 – (Insert the steel product "title" from Table B-1) – (Insert sequential package number beginning with "1"). Example: PN525 – Steel H Piling – 1, PN 525 – Structural Steel – 2, etc…

b. The steel product quantity in pounds (kg).
c. Steel Certification and Mill Test Reports for the steel product.
d. The date the steel product, subject to adjustment, was shipped from the producing mill.

Upon the incorporation of the steel product into the work, provide the Engineer the following:

1) An affidavit signed by the Contractor, or DBT stating that the documentation provided is true and accurate.
2) Identification of the steel product subject to adjustment.
    a. Documentation package number that was initially established for the steel product for which the price adjustment will be calculated.
    b. The actual steel product quantity in pounds (kg) that was incorporated into the work.

Price Adjustment Calculations

The below formulas allow for a variation in steel prices without recognizing cost increases/decreases within the range of - 90 % to 110% of the Bidding Index (BI). The total steel price adjustment (SPA) will not be computed unless the percent **% Change** is - 10% or more, increase or decrease:

$$\% \text{ Change} = [(MI/BI) - 1] \times 100$$

For a Price Increase:

$$SPA = [(MI/BI) - 1.10] \times BI \times (Q/100)$$

MI and BI are in terms of dollars ($) per hundredweight (CWT). Therefore, Quantity (Q) of structural steel is divided by 100.

Example: If the Project was bid on 4/8/2008, the BI for a category 1 pay item in March 2008 is $46.48. If wide flange beams have a documented weight of 34500 pounds and the mill date of 9/8/2009, the MI for September 2008 is $60.23

Check threshold:

$$\% \text{ Change} = [(\$60.23/CWT / \$46.48/CWT) - 1] \times 100 = 29.58,$$

Is ABS (29.58) > 10? Yes

Calculate SPA = [($60.23/CWT / $46.48/CWT)-1.10] x $46.48/CWT x 34,500 lbs/100

= $3,140.19 (positive adjustment)

For a Price Decrease:

SPA = [(MI/BI) – 0.90] x BI x (Q/100)

MI and BI are in terms of dollars ($) per hundredweight (CWT). Therefore, Quantity (Q) of structural steel is divided by 100.

Example: If the Project was bid on 1/8/2009, the BI for a category 1 pay item in January 2009 is $47.83. If wide flange beams have a documented weight of 34500 pounds and the mill date of 4/8/2009, the MI for April 2009 is $37.38.

Check threshold:

% Change = [($37.38/CWT/$47.83/CWT) - 1] x 100 = -21.85,

Is ABS (-21.85) > 10? Yes

Calculate SPA = [($37.38/CWT/$47.83/CWT)-0.90] x $47.83/CWT x 34,500 lbs/100

= -$1,955.12-(negative adjustment)

Where:

SPA = Steel Price Adjustment

MI = Mill Shipping Index. – in Dollars ($) per hundredweight (CWT). Use the adjustment indices from the month the steel was shipped from the producing mill and properly documented. The adjustment indices will be posted on ODOT's website.

BI = Bidding Index. - in Dollars ($) per hundredweight (CWT). Use the adjustment indices from the month in which the project is bid. The adjustment indices will be posted on ODOT's website.

Q = Quantity of the steel product, pounds actually incorporated into the work as documented by the Contractor, or DBT and verified by the Engineer.

C. Price Adjustment Limitations: The price adjustments are limited to a % Change of 50%, increase or decrease.

Example 1: When the Project was bid, the BI for a category 1 pay item with a quantity of 50,000 pounds was $39.00, and the MI for the month in which the steel was shipped was $60.23.

Check threshold:

% Change = [($60.23/CWT/$39.00/CWT)-1] x 100 = 54.44% The

limit is 50%, thus the SPA is calculated as follows:

SPA = [1.50 – 1.10] x BI x (Q/100)

SPA = [1.50-1.10] x $39.00/CWT x 50,000 lbs/100
= $7,800.00

Example 2: When the Project was bid, the BI for a category 1 pay item with a quantity of 50,000 pounds, was $60.23, and the MI for the month in which the steel was shipped was $29.00

Check threshold:

% Change = [($29.00/CWT/$60.23/CWT)-1] x 100 = -51.85% the

limit is -50 %, thus the SPA is calculated as follows:

SPA = [0.50-0.90] x BI x Q

SPA = [0.50-0.90] x $60.23/CWT x 50,000 lbs/100

= -$12,046.00

D. Payment/Deductions: The price adjustment will be paid, or deducted from the Contractor's, or DBT's progress estimate, upon approval of a change order.

If the price adjustment is based on estimated material quantities for that time, and a revision to the total material quantity is made in a subsequent or final estimate, an appropriate adjustment will be made to the price adjustment previously calculated. The adjustment will be based on the same indices used to calculate the price adjustment that is being revised. If the shipping date(s) of the revised material quantity cannot be determined, the adjustment for the quantity in question, will be based on the indices utilized to calculate the steel price adjustment for the last initial documentation package submission, for the steel product subject to adjustment, that was incorporated into the particular item of work, for which quantities are being finalized.

Example: Structural steel for a particular bridge was provided for in three different shipments with each having a different mill shipping date. The quantity of structural steel actually used for the bridge was calculated and a steel price adjustment was made in a progress payment. At the conclusion of the work, an error was found in the calculation of the final quantity of structural steel used for the bridge.

The quantity to be adjusted cannot be directly related to any one of the three mill shipping dates. The steel price adjustment for the quantity in question would be calculated using the indices that were utilized to calculate the steel price adjustment for the quantity of structural steel represented by the last initial structural steel documentation package submission. The package used would be the one with the greatest sequential number.

E. Mill Index after the Approved Completion Date: When steel products are shipped from the mill after the approved contract completion date, steel price adjustments will be based on the MI for the month of the approved contract completion date or the MI for the actual month the steel was shipped, using whichever MI is less.

F. Documentation Review: The County reserves the right to inspect the records of the Contractor or DBT, its subcontractors, material fabricators and suppliers to verify the accuracy of the documentation submitted to the County.

G. Extra Work/Force Account: When steel product, as specified herein, are added to the contract as Extra Work, in accordance with the provisions of the Cuyahoga County Engineer's General Provisions Section 109, no steel price adjustments will be made for any products manufactured from steel having a mill shipping date 5 business days after the County's request. Price adjustments will be made as provided herein however the BI shall be based on the month of the County's request. The MI will be based on the month the steel was shipped from the producing mill and after the Extra Work request. For extra work performed on force account basis, reimbursement of actual material costs, along with the specified overhead and profit markup, will be considered to include full compensation for the current cost of steel and no steel price adjustments will be made.

FUEL PRICE ADJUSTMENT

General: This Fuel Price Adjustment (Fpa) provision is intended to minimize risk to the Contractor or Design Build Team, (DBT) due to fuel price fluctuations that may occur during the Contract. This provision is not designed to estimate actual quantities of fuel used in construction operations, but to provide a reasonable basis for calculating a fuel price adjustment based on average conditions.

The County determines adjustments under the provisions of this Proposal Note and presumes that the Contractor/(DBT) has relied on these provisions when determining unit bid prices. The monthly application range for percent change (Mbp/Cbp) will not exceed 50% for a Fuel Price Adjustment increase or decrease as outlined in Section B, Calculation of Fuel Price Adjustment.

A. Price Adjustment Criteria: These requirements provide for a price adjustment, positive or negative, to payments due the Contractor/(DBT) for fluctuations in the cost of fuel consumed in the performance of certain items of work. The total price adjustment must be more than $400. These price adjustment provisions apply only to those items in the contract as grouped by category and identified in Table A-1. All adjustments will be made based on fuel consumption indicated by Table A-1, and no changes will be made for actual consumption rates.

Category descriptions and the fuel usage factors that are applicable to each are as follows:

Fuel Adjustment Categories, Table A-1				
Category	**Basis of Calculation and Threshold Quantity**	**Eligible Items**	**Units**	**Fuel Usage Factor**
Earthwork	Apply only to the greater of the sum of all Excavation quantities or the sum of all Borrow and Embankment quantities. Threshold Quantity* = 30,000 c.y. (22,936 c.m.)	203, 204	Gallons per cubic yard (**Gallons** per cubic meter)	0.50 (0.65)
Aggregate Bases	Apply to quantity calculated based on the Method of Measurement and Basis of Payment. Threshold Quantity* = 2,500 c.y. (1,912 c.m.)	304, 307	Gallons per cubic yard (**Gallons** per cubic meter)	0.75 (0.98)
Select Granular Backfill	Apply to quantity calculated based on the Method of Measurement and Basis of Payment. Threshold Quantity* = 2,000 c.y. (1,529 c.m.)	840	Gallons per cubic yard (**Gallons** per cubic meter)	0.75 (0.98)
Flexible Bases and Pavements	Apply to quantity calculated based on the Method of Measurement and Basis of Payment. Threshold Quantity* = 1,200 c.y. (917 c.m.)	301, 302, 424, 441, 442, 443, 446, 448, 614, 615, 803, 806, 826, 851, 857, 860, 880	Gallons per cubic yard (**Gallons** per cubic meter)	1.70 (2.22)
Rigid Bases and Pavements	Apply to quantity calculated based on the Method of Measurement and Basis of Payment. Threshold Quantity* = 1,200 c.y. (917 c.m.)	305, 306, 451, 452, 526, 884	Gallons per cubic yard (**Gallons** per cubic meter)	1.00 (1.31)
Structural Concrete	Apply to quantity calculated based on the Method of Measurement and Basis of Payment. Threshold Quantity* = 350 c.y. (268 c.m.)	511, 524, 842, 892	Gallons per cubic yard (**Gallons** per cubic meter)	4.00 (5.23)

* A Fuel Price Adjustment will only apply when the sum of all **original** contract quantities or for Design

Build Projects all completed in-place accepted final quantities for the category meet or exceed the specified Threshold Quantity. When a Fuel Price Adjustment applies, calculate the Fuel Price Adjustment for the sum of all quantities for the category per this proposal note.

B. Calculation of Fuel Price Adjustment: Fuel Price Adjustments may be either positive or negative. A positive Fuel Price Adjustment will result in a payment to the Contractor/(DBT) while a negative Fuel Price Adjustment will result in a deduction.

The County will calculate a Monthly Base Price (Mbp) for fuel for each month of each calendar year beginning with January 2001. The method for calculating the Monthly Base Price (Mbp) will be on file in the ODOT Division of Construction Management. The Monthly Base Price (Mbp) will be used to calculate all Fuel Price Adjustments. The Contract Base Price (Cbp) will be the Monthly Base Price (Mbp) for the month the contract was bid. All Monthly Base Price (Mbp) values will be posted on the Division of Construction Management, Office of Construction Administration website at:

http://www.dot.state.oh.us/Divisions/ConstructionMgt/Admin/Pages/PriceIndexes.aspx

During each month of the contract, the Engineer will select the applicable Monthly Base Price (Mbp) and calculate the ratio of the Monthly Base Price (Mbp) divided by the Contract Base Price (Cbp). The formulas below allow for a variation in fuel prices without recognizing cost increases/ decreases within the range of 90% to 110% of the Contract Base Price (Cbp).

When, and only when, the Monthly Base Price (Mbp) divided by the Contract Base Price (Cbp) is less than 0.90 or greater than 1.10 will the Engineer calculate a Fuel Price Adjustment (Fpa).

Cost increases in excess of 150% of the Contract Base Price (Cbp) will not be recognized. When, the Monthly Base Price (Mbp) divided by the Contract Base Price (Cbp) is greater than 1.50, the Fpa shall be calculated using a Cbp/Mbp ratio of 1.50.

Cost decreases in excess of 50% of the Contract Base Price (CBP) will not be recognized. When, the Monthly Base Price (Mbp) divided by the Contract Base Price (Cbp) is less than 0.50, the Fpa shall be calculated using a Cbp/Mbp ratio of 0.50.

For a Price Increase:

$$Fpa = [(Mbp/Cbp) - 1.10] \times Cbp \times Q$$

For a Price Decrease:

$$Fpa = [(Mbp/Cbp) - 0.90] \times Cbp \times Q$$

Where:

Fpa = Fuel Price Adjustment
Mbp = Monthly Base Price
Cbp = Contract Base Price
Q = The number of gallons of fuel used in the placement of items identified in Table A-1 during that month at the specified Fuel Usage Factor. Q will be determined by the Engineer for each category by multiplying the applicable Fuel Usage Factor by the sum of quantities of completed and accepted work for the specified items.

The total Monthly Fuel Price Adjustment will be the algebraic sum of the Fuel Price Adjustments for materials placed during the month for each applicable category identified in Table A-1. The Total Fuel Price Adjustment for the project will be the algebraic sum of all Monthly Fuel Price Adjustments. The County will calculate the Monthly and Total Fuel Price Adjustment on a monthly basis and make contract modifications as provided in Section C, Payment/Deduction.

C. Payment/Deduction: The Fuel Price Adjustment will be paid, or deducted, upon approval of a change order prepared after completion of all work. Contractor/(DBT) markups are not permitted. Partial payments or deductions will be processed prior to total completion when the unpaid accrued Total Fuel Price Adjustment exceeds $10,000 or once every 12 months.

D. Expiration of Contract Time: When eligible items of work grouped by category and identified in Table A-1 are performed after expiration of contract time and liquidated damages are chargeable, the value of Monthly Base Price (Mbp) used to compute the price adjustment will be either the Monthly Base Price (Mbp) at the time of actual performance or the Monthly Base Price (Mbp) at the time contract time expired, whichever is less.

E. Extra Work: When eligible items of work grouped by category and identified in Table A-1 are added to the contract as Extra Work and for which a unit price is negotiated the Contractor/(DBT) must use the appropriate price for fuel when preparing required backup data for the negotiated price. No Fuel Price Adjustment will be made for fuel consumed in the performance of eligible work added to the contract as Extra Work at a negotiated price when the work commences within 90 days of the approval of the change order authorizing said extra work. If the eligible work at a negotiated price commences more than 90 days after the approval of the change order authorizing said extra work a Fuel Price Adjustment will be made if said extra work quantities exceed the applicable threshold quantity in Table A-1. The Fuel Price Adjustment will be calculated using the Monthly Base Price (Mbp) value for the month the change order authorizing said extra work was approved as the value for its Contract Base Price (Cbp).

When Extra Work is added to the contract as a Force Account operating costs for equipment used in the performance of this work will be paid in accordance with 109.05.C.4 of the Cuyahoga County Engineer's General Provisions with no further adjustment.

F. Final Quantities: Upon completion of the work and determination of final pay quantities a change order will be prepared to reconcile any difference between estimated quantities previously paid and the final quantities. In this situation, the value for the Monthly Base Price (Mbp) used in the price adjustment formula will be the average of all Monthly Base Price (Mbp) values previously used for computing price adjustments.

DESIGN REQUIREMENTS FOR PLANT MIX PAVEMENTS

Design 301 base and all asphalt concrete requiring 441 as follows:

ADTT	PAVEMENT DESIGN REQUIREMENTS
≥1500 TRUCKS	HEAVY traffic volumes
50 TO 1499 TRUCKS	MEDIUM traffic volumes
<50 TRUCKS	LIGHT traffic volumes

ASPHALT BINDER PRICE ADJUSTMENT

A. Eligibility

This note shall apply on all projects that specify asphalt concrete with a minimum of 1,000 CY for any contract item listed in the General Summary (Schedule of Contract Items); or on design-build projects where a minimum of 1,000 CY is expected to be used on any contract item listed in the Schedule of Contract Items.

If the Ohio Department of Transportation's (ODOT's) asphalt binder index has increased or decreased in excess of 10%, asphalt concrete may be eligible for a price adjustment. The total price adjustment must be more than $400.

B. Price Adjustment Criteria and Conditions:

ODOT will establish and publish the asphalt binder Bidding Index (BI) and Placing Index (PI) for each month of each calendar year. The asphalt binder indexes will be posted on ODOT's website.

ODOT will establish the asphalt binder indexes based on the data provided in the Poten & Partners, Inc., Asphalt Weekly Monitor® (AWM) (http://www.poten.com/copyright.asp)

ODOT will use the selling price for PG 64-22 paving grade asphalt from the Midwest/Mid-continent Markets of Illinois/Michigan/Ohio/Indiana/Kentucky for the Ohio cities/areas listed. ODOT will average the Ohio cities/areas low and high selling prices as published in the last weekly publishing period of each month that includes the last Friday of the month to calculate the BI and PI. The calculated asphalt binder BI will be posted by ODOT as the index for the following month. The calculated asphalt binder PI will be posted by ODOT as the index for the current month.

ODOT's Director will determine the asphalt binder indexes in the event data from the AWM is unavailable for any reason.

C. Price Adjustment Calculations

If the ratio of the PI to the BI is greater than 1.10 or less than 0.90, the County will adjust the compensation the contractor receives for eligible quantities of asphalt concrete. The adjustment is based on the bid month and the month of asphalt concrete placement. The adjustment will apply to the price for asphalt binder used in eligible asphalt concrete quantities according to the following formula:

For a price increase:

$$PA = \left(\frac{PI}{BI} - 1.10\right) x\ C\ x\ Q$$

For a price decrease:

$$PA = \left(\frac{PI}{BI} - 0.90\right) x\ C\ x\ Q$$

Where:

PA = Price Adjustment

BI = Bidding Index, the asphalt binder index for the month the project is bid

PI = Placing Index, the asphalt binder index for the month the asphalt concrete is placed

C = BI x percent virgin asphalt binder / 100

Q = Eligible quantity of asphalt concrete in tons (metric tons)

The percent of virgin asphalt binder used to calculate C is determined from the approved Job Mix Formula (JMF).

The eligible quantity of asphalt concrete, Q, is the complete, in-place, and accepted quantity in tons (metric tons) placed in the month being considered for price adjustment. If the quantity is paid in cubic yards (cubic meters), the County will convert the volume into tons (metric tons) using the conversion factor established according to ODOT's Construction and Material Specifications Item 401.21.

If eligible asphalt concrete is placed beyond an approved Contract Completion Date, the County will base price adjustments on either the PI for the last month of the approved Contract Completion Date, or the PI for the actual month of placing, using whichever PI is less.

At a minimum, the County will calculate and apply price adjustments at the end of each construction season and as soon as practical after the completion of the project.

D. Extra Work/Force Account:

When new asphalt concrete pay items are added to the contract as Extra Work, in accordance with the provisions of Section 109.05 of the Cuyahoga County Engineer's General Provisions, no price adjustments will be made.

PORTLAND CEMENT PRICE ADJUSTMENT FOR MULTI-YEAR PROJECTS

A. Eligibility: This price adjustment applies to portland cement concrete (PCC) placed under Items 305, 451, 452 and 884 with a minimum of 10,000 SY for any contract item listed in the General Summary (Schedule of Contract Items); or on design-build multi-year projects where a minimum of 10,000 SY is expected to be used on any contract item listed in the Schedule of Contract Items, subject to any exclusions or limitations provided herein.

If the Ohio Department of Transportation's (ODOT's) portland cement index has increased or decreased in excess of 10%, PCC may be eligible for a price adjustment. Eligibility is determined as follows:

1. Any contract item listed in the Schedule of Contract Items specifying more than 1800 SY (1505 m^2) of PCC complete, in-place, and accepted; or

2. For design-build projects, any contract item listed in the Schedule of Contract Items and with more than 1800 SY (1505 m^2) of PCC complete, in-place, and accepted.

ODOT will publish a Monthly Index calculated using data released by the United States Department of Labor, Bureau of Labor Statistics (BLS). The Monthly Index will be determined using Producer Price Index-Commodities table for Series Id: WPU1322, Not Seasonally Adjusted, Group: Nonmetallic mineral products, Item: Cement, hydraulic, Preliminary (P).

This monthly index value applies to the corresponding project letting or eligible concrete placement month (i.e. the monthly index value released during the first week of January applies to all projects let or concrete placed in January). The monthly index will be the BLS Preliminary (P) number and will not be modified if the value changes in the BLS data after original publication.

B. Price Adjustment Criteria and Conditions: The County will determine the quantity of Portland cement using the approved JMF for the Portland cement component only. If the ratio of the placing index (*PI*) to the bidding index (*BI*) is greater than 1.10 or less than 0.90 the County will adjust compensation that the Contractor receives for work performed each month under eligible contract items specifying portland cement concrete. The total price adjustment must be more than $400. The adjustment will apply to portland cement used in those contract items according to the formulas herein.

Price Adjustment Calculations

The below formulas allow for a variation in cement prices without recognizing cost increases/decreases within the range of 90% to 110% of the Bidding Index (BI). The total portland cement price adjustment (PCPA) will not be computed unless the percent **% Change** is 10% or more, increase or decrease:

% Change = [(PI/BI) – 1] x 100

For a price increase:

PCPA = [(PI/BI) – 1.10] x BI x Q

For a price decrease:

PCPA = [(PI/BI) – 0.90] x BI x Q

Where:

PCPA = Portland Cement Price Adjustment

PI = Placing Index. The published monthly index for Portland cement, Type 1, released during the first week of the month in which the portland cement concrete item was placed.

BI = Bidding Index. The published monthly index for portland cement, Type 1, released during the first week of the month in which the portland cement concrete item was bid.

Q = Quantity of the portland cement, tons, incorporated into the work as documented by the Contractor and verified by the Engineer.

C. Payment/Deductions: If eligible portland cement concrete is placed beyond an approved Contract Completion Date, the County will base price adjustments on either the PI for the last month of the approved Contract Completion Date, or the PI for the actual month of placing, using whichever PI is less. At a minimum, the County will calculate and apply price adjustments at the end of each construction season and as soon as practical after the completion of the project.

D. Documentation Review: The County reserves the right to inspect the records of the Contractor, its subcontractors, material fabricators and suppliers to verify the accuracy of the documentation submitted to the County.

E. Extra Work/Force Account: When portland cement concrete, as specified herein, is added to the contract as Extra Work, in accordance with 109.05 of the Cuyahoga County Engineer's General Provisions, no portland cement price adjustments will be made.

SEALING CONTACT SURFACES (401.14) AND SURFACE COURSE JOINTS (401.15 AND 401.17)

Per the requirements of 401.14, paint all contact surfaces, including vertical faces of curbing, gutters, manholes, catch basins, monuments, water valves and other castings with a thin, uniform coating of a certified PG 64-22 or PG 64-28 asphalt binder (702.01) before placing the asphalt concrete against them. After completion of the surface course, seal gutters, edges along the above mentioned castings, butt joints, feather joints (all prior to the placement of pavement markings), asphalt driveway joints, etc. with a certified PG 64-22 or PG 64-28 asphalt binder (702.01) as directed by the Engineer. The material shall be applied at a uniform width of two (2) inches and at a rate just sufficient to fill surface voids per 401.15. Unless otherwise directed/approved by the Engineer, seal all longitidunal and transverse construction joints per 401.17 prior to the placement of pavement markings. Any additional costs associated with the above requirements shall be included in the appropriate asphalt concrete course item of work.

SEALING JOINTS IN CAST-IN-PLACE CONCRETE CURB AND COMBINATION CURB AND GUTTER REQUIRED (609.04)

It **is** required to seal transverse joints in cast-in-place concrete curb and combination curb and gutter with 705.04 joint sealer material.

FINAL ACCEPTANCE OF PAVEMENT MARKINGS

Final acceptance of approved completed markings shall be no less than 30 days and no more than 90 days after completion of all original work; all at the discretion/determination of the Engineer.

Pavement markings which are unacceptable, or become unacceptable prior to final acceptance as determined by the Engineer, for causes such as, but not limited to improper application, non-uniform retroreflectivity, nonretroreflectivity or loss of adhesion to the pavement, shall be replaced by the Contractor with markings conforming to these specifications and requirements at his/her expense, without delay or the Contractor may request that the unacceptable work be non-performed. The Contractor will receive no payment for unacceptable work that is non-performed.

ODOT QUALIFIED PRODUCTS LIST AND ACCEPTANCE

The Ohio Department of Transportation has developed a Qualified Products List (QPL) for acceptance of various materials. This list is accessible through the Office of Materials Management's website at:

http://www.dot.state.oh.us/Divisions/ConstructionMgt/Materials/Pages/QPL.aspx

For the Construction and Materials Specification Items listed on the QPL, only materials produced by those QPL listed sources will be acceptable. Only provide materials for project use from the companies and the brand names listed on the QPL. Assure those materials can be identified by company and brand name. No plant sampling and testing is required. No TE-24 shipping document is required. No other documentation is required.

The County will not accept materials from Producers not listed on the website. Producers of materials listed on the QPL can access submittal and acceptance requirements on the QPL website under Material Description.

CLEVELAND METROPARKS APPROVED SEED MIXTURES FOR RESTORATION OF GRASS AREAS

Following final grading and placement of 2"-4" approved topsoil from stockpile or furnished per ODOT CMS 651, 652 and 653, areas near wetlands shall be seeded as follows and as shown on the plans:

Wet Meadow – FACW Wetland Meadow Mix by Ernst Conservation Seeds #ERNMX-122 (ph: 1-800-873-3321). Apply at a rate of 15 pounds per acre or ½ pound per 1,000 square feet. Mulch with 1 ½" loosely spread straw.

Native Wildflower Mix – Native Wildflower Mix by Ernst Conservation Seeds #ERNMX-153-1, modified by substituting 15% Timothy for Partridge Pea (ph: 1-800-873-3321). Apply at a rate of 15 pounds per acre or ½ pound per 1,000 square feet. Mulch with 1 ½" loosely spread straw.

For all other disturbed areas not specifically designated for specific seed mixes shall be seeded with a general purpose "Lawn-Sun" Park Mix as follows:

General Purpose Lawn – 30% Perennial Rye, 30% Creeping Red Fescue and 40% Kentucky Bluegrass. Seed at a rate of 5 pounds per 1,000 square feet. Apply a 10-10-10 starter fertilizer at a rate of 20 pounds per 1,000 square feet. Mulch with 1 ½" loosely spread straw.

Erosion control matting shall be furnished and installed on all areas that have received topsoil and seed, or as indicated on the plans, per ODOT CMS 671 Types A, B or F, or as proposed by the Contractor and approved by the Engineer and/or the Cleveland Metroparks prior to installation.

CUYAHOGA VALLEY NATIONAL PARK APPROVED SEED MIXTURES FOR RESTORATION OF GRASS AREAS

Furnish all labor, equipment and materials for fertilizing, preparing seedbed, seeding and mulching the areas shown on the plans and all disturbed or re-graded non-paved areas disturbed by construction. Place Type A (General Lawn Mix) seed in areas expected to be mowed (i.e. areas adjacent to all-purpose trails, parking areas, roadways, etc.). Place Type B (Native Grass Mix) seed in all other areas not expected to be mowed.

MATERIALS:

TYPE A Seed Mixture (General Lawn)

Seed Type	Proportion By Weight	Minimum Purity	Minimum Germination
Poa Pratensis, Variety "Adelphi" Kentucky Bluegrass **	0%	95%	80%
Poa Pratensis, Variety "Rugby" Kentucky Bluegrass **	30%	95%	80%
Poa Pratensis, Variety "Nassau" Kentucky Bluegrass **	0%	95%	80%
Lolium Perenne, Variety "Manhattan" Perennial Ryegrass	40%	98%	90%
Festuca Arundinacea, Variety "Rebel" Tall Fescue	30%	97%	85%

1. Supply two of the three varieties noted (**) in equal proportions.
2. Nominal Application Rate: 6 pounds PLS per 1,000 square feet

TYPE B Seed Mixture (Native Grasses)

Seed Type	Proportion By Weight	Minimum Purity	Minimum Germination
Panicum Virgatum Blackwell Switchgrass	40%	98%	85%
Sorghastrum Nutas Tomahawk Indiangrass	10%	98%	85%
Lolium Multiflorum Annual Ryegrass	50%	98%	85%

1. Supplier: Oliger Seed Company, 89 Hanna Parkway, Akron, Ohio 44319 (ph: 330-724-1266) or Allwood Audubon Center & Farm, 1000 Aullwood Road, Dayton, Ohio 45414 (ph: 937-890-7360) or approved equal.+
2. Nominal Application Rate: 50 pounds PLS per acre

Actual seeding rates will be on the basis of Pure Live Seed (PLS) at the time of seeding, where PLS = (% Purity) x (% Germination). The actual seeding rate shall be calculated as the Nominal Application Rate divided by the PLS.

All seed shall be delivered in acceptable condition in original, unopened containers. The Engineer or the Cuyahoga Valley National Park reserve the right to test, reject or approve all seed after delivery on the project.

Fertilizer shall be Federal Specification (FS) O-F-241, granular or pellet form, complete commercial type 12-12-12, spread at the rate determined by soil test results. Fertilizer shall be delivered in original, unopened containers with analysis, type and trade name attached.

Mulch shall be clean straw free from noxious weed seed and other harmful elements as specified in ODOT CMS Section 659.14. Commercial products may be used with the approval of the Engineer or the Cuyahoga Valley National Park.

Ground Agricultural Lime shall be per ODOT CMS Section 659.03 except that the material is to be derived from dolomitic limestone. Spread at the rate determined by soil test results.

EXECUTION:
Bed Preparation – After grading operations are complete, loosen the soil to a depth of 4" and remove large rocks, debris and clods. Spread fertilizer and lime evenly and incorporate into the soil.

Seeding Requirements – Sow seed uniformly at the prescribed or calculated rates during planting season, May 1 to November 15. Seeding on frozen ground or when the temperature is 35º F or lower is prohibited. Seed and mulch according to ODOT CMS 659.12 and 659.13. Seed all disturbed areas not otherwise surfaced or covered by live plant cuttings with either Type A or Type B seed as shown on the plans or as directed by the Engineer or the Cuyahoga Valley National Park. Mulch within 24 hours of seeding.

Mulching – Immediately after seeding, apply mulch uniformly at a rate of two (2) tons per acre.

MAINTENANCE OF SEEDED AREAS:

Maintain all seeded areas by watering and replant as necessary to establish a uniformly dense stand of specified grass until accepted. Areas with Type A seed shall be maintained until the third cutting and as much longer as necessary to establish a uniformly dense stand. Make the first cutting when Type A seeded areas have reached a height of three (3) inches. Cut to a height of two and one-half (2 ½) inches. Do not cut Type B seeded areas.

Re-seed, re-fertilize, and re-mulch as directed by the Engineer or the Cuyahoga Valley National Park, at no additional cost, any areas failing to establish a stand. Re-seeding shall conform in all respects to these specifications. Scattered bare spots, smaller than one (1) square foot, will be allowed up to five (5) percent of the seeded areas.

Repair any damage to the work areas resulting from erosion and/or equipment at no additional cost. Repair damage, including re-grading, re-seeding, etc. before significant damage occurs.

Seeding limits are generally within the work area limits shown on the plans or as directed by the Engineer or the Cuyahoga Valley National Park. No payment will be made for areas disturbed beyond these limits.

CRITICAL PATH METHOD PROGRESS SCHEDULE FOR SHORT DURATION PROJECTS

A. General. The progress schedule required for this project is the critical path method schedule (CPM schedule). The Contractor shall designate a Schedule Representative who shall be responsible for coordinating with the Engineer during the preparation and maintenance of the schedule. The requirements of this note replace the progress schedule requirements in 108.03 of the Cuyahoga County Engineer's General Provisions.

B. Baseline Schedule. The Contractor shall submit a baseline schedule within 15 days of the execution of the Contract, or prior to the start of work, whichever comes first. The baseline schedule will be in CPM schedule format and as described below. The Engineer will review the baseline schedule and will either "approve", "approve as noted" or "reject" the schedule within 10 days of receipt. If the Engineer does not provide written notification regarding the disposition of the baseline schedule within 10 days, the submission will be considered approved.

For baseline schedules that are "approved as noted", the Contractor shall make the necessary revisions and resubmit the revised schedule within 10 days. The Engineer will only reject baseline schedules that do not comply with contract requirements.

For baseline schedules that are "rejected", the Engineer shall indicate in writing all portions of the schedule that do not comply with the contract requirements. The Engineer shall conduct a mandatory meeting with the Contractor and the Contractor's Schedule Representative within 10 days of the Engineer's written notice. The purpose of this meeting is to resolve all issues with the baseline schedule. At this meeting, the Contractor shall provide clarification and all additional information necessary for the Engineer to "approve" the baseline schedule.

In the event the baseline schedule is not "approved" within 60 days of execution of the contract, all work shall cease on the project until the baseline schedule is "approved".

Approval of the baseline schedule does not revise the Contract Documents. The baseline schedule must be "approved" or "approved as noted" by the Engineer prior to the Engineer evaluating any Contractor claims associated with time impacts.

1. Schedule Requirements. Generate the baseline schedule using P6 Project Planner by Primavera Systems Inc., Bala Cynwyd, PA.

Provide a working day schedule that shows the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the Original Contract Completion Date. Show the order and interdependence of activities and the sequence for accomplishing the work. Describe all activities in sufficient detail so that the Engineer can readily identify the work and measure the progress of each activity. The baseline schedule must reflect the scope of work, required phasing, maintenance of traffic requirements, interim completion dates, the Completion Date, and other project milestones established in the Contract Documents. Include activities for submittals, working drawings, shop drawing

preparation/submittal, County's review time for the shop drawings, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities.

The Contractor shall be responsible for assuring all work, including all subcontractor work, is included in the schedule. The Contractor shall be responsible for assuring that all work sequences are logical and that the schedule indicates a coordinated plan.

Failure by the Contractor to include any element of work required for performance of the Contract shall not excuse the Contractor from completing all work within the required time. The Engineer's review of the baseline schedule will be for compliance with the specifications and contract requirements. Approval by the Engineer will not relieve the Contractor of any of their responsibilities for the accuracy or feasibility of the schedule. Omissions and errors will be corrected as described in Section E or H in this note and will not affect contract time.

a) Administrative Identifier Information:

1. County Road Name / Route Number
2. Project Limits
3. Contract Notice to Proceed Date
4. Completion Date
5. Contractor's Name
6. Contractor's Dated Signature
7. County Dated Approval Signature

b) Project Activities:

i. Activity Identification (ID). Assign each activity a unique identification number. Activity ID length shall not exceed 10 characters. Once accepted, the Activity ID shall be used for the duration of the project.

ii. Activity Description. Each activity shall have a narrative description consisting of a verb or work function (e.g.; form, pour, excavate) and an object (e.g.; slab, footing, underdrain).

iii. Activity Original Duration. Assign a planned duration in working days for each activity. Do not exceed a duration of 20 working days for any construction activity unless approved by the Engineer. Do not represent the maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.

iv. Activity Relationships:

- All activities, except the first activity, shall have a predecessor(s). All activities, except the final activity, shall have a successor(s).

- Use only finish-to-start relationships with no leads or lags to link activities or use start-to-start relationships with lags no greater than the predecessor duration to link activities.
- Use of finish-to-finish relationship is permitted when both activities are already linked with a start-to-start relationship.

c) Project Milestones:

i. Start Project: The Contractor shall include as the first milestone in the schedule, a milestone named “Start Project”. The date used for this milestone is the date the contract is executed and signed by the County.

ii. End Project Milestone: The Contractor shall include as the last activity in the project schedule, a milestone named “End Project”. The date used for this milestone is considered the project completion date.

iii. Start Phase Milestone: The Contractor shall include as the first activity for a project phase, an activity named "Start Phase X", where "X" identifies the phase of work. The Contractor may include additional milestones but, as a minimum, must include all contractual milestones.

iv. End Phase Milestone: The Contractor shall include as the last activity in a project phase, an activity named "End Phase X" where "X" identifies the phase of work. The Contractor may include additional milestones, but at a minimum contractual milestones.

d) Hammock:
Use hammocks to show the duration of specified contract work periods, phases and road closures. The hammock activity type is allowed to have a start-to-start relationship with the first activity in a series of activities and a finish-to-finish relationship with the last activity in a series of activities.

e) Constraints:
Use constraints sparingly in the schedule. If constraints are used, use only Early Constraints or Late Constraints.

f) Weather and Seasonal Conditions:
The winter shutdown periods shall be shown using non-work calendars. The activity can be assigned to a calendar indicating times of non-work. These custom calendars can be created to show days, weeks, or months of non-work. Weather and seasonal conditions, as shown in Table 108.06-1 of the Cuyahoga County Engineer’s General Provisions, shall be evenly dispersed into the CPM schedule calendars as non-work days and be included in the planning and scheduling of all work.

g) Linking Projects:
Independent projects shall not be linked using Primavera's Interproject Relationship Manager Application.

h) Activity Codes:
The Contractor shall, at a minimum, include Project Activity Codes for Area, Phase, and Responsibility for each activity.

i) Resource Loading – Each Activity shall be loaded with all resources (labor only) required to complete the activity. Each subcontractor's resources shall be loaded independently so that they may be reviewed separately.

j) Schedule Options:
The schedule may only be calculated using retained logic. Show open ends as non-critical. Schedule durations are to be contiguous. Total float shall be calculated as finish float. Ignore relationships to and from other projects.

2. Submission Requirements. Submit all schedules within the time frames specified.
Submit the schedule and information in electronic file format via email or compact disc (CD) compatible with the Engineer's computer. Submit the following information along with the electronic baseline schedule:

a) A baseline schedule in a CPM format including the Administrative Identifier Information discussed in Section B.1.a on the first page of the schedule. For each activity on the chart, indicate the Activity ID, Activity Description, Original Duration, Remaining Duration, Total Float, Start Date, Finish Date, and Calendar ID. Use arrows to show the relationships among activities.

b) A baseline schedule in CPM format, on paper. Identify the critical path of the project on the bar chart in red. The critical path is defined as the longest path of activities in the project that determines the project completion date. The activities that make-up the critical path of activities is the "Critical Activities."

c) Resource Curve – This curve shall graphically show both the average daily manpower each week and the cumulative resource usage (manpower only). The daily manpower shall be shown using stacked bars with each subcontractor represented by a different color.

d) A Six Week Look Ahead Schedule in CPM format (If requested by the Engineer). This schedule will have all the requirements of the baseline schedule in CPM format except that it shall be limited to those activities that have an early start or early finish within a six-week period of the data date.

e) A Scheduling Statistics Report (If requested by the Engineer). Submit a report of baseline schedule statistics, including number of activities, number of activities on the longest path, number of started activities, number of completed activities, number of relationships, percent complete, and number and type of constraints.

f) A Logic Diagram (If requested by the Engineer). Submit a diagram in PERT chart format showing the logic of the baseline schedule.

g) An Activity ID Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule sorted by ascending Activity Identification Number.

h) A Total Float Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule sorted by increasing total float and by early start date.

i) A Detailed Predecessor/Successor Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule indicating the activities that immediately precede and immediately succeed that activity in the schedule logic.

C. Float. Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to County caused delay), lag logic restraints, zero total or free float constraints, extending activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates.

1. Definitions of Float: Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the End Project Milestone and the Contract Completion Date.

2. Ownership of Float: Float available in the schedule, at any time shall not be considered for the exclusive use of either the County or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained because of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the Project Float. A schedule showing work completing in less time than the contract time, and accepted by the County, will be considered to have Project Float. Project Float will be a resource available to both the County and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the project's critical path, consumes all available float and extends the work beyond the Contract Completion Date.

3. Negative Float: Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the Section F. Scheduled completion date(s) that extend beyond the contract (or phase) completion date(s) may be used in computations for assessment of liquidated damages. The use of this computation is not to be construed as an order by the County to accelerate the project.

D. Monthly Update Schedule. A monthly update schedule is a schedule in which only progress is updated from the prior data date to the current data date. Work added, and/or excusable delays encountered since the prior data date must be represented as a schedule revision as described in Section E.

1. Update Requirements. On the tenth day of the current month, during the life of the Project, submit an updated schedule and all required information with a data date of the last day of the preceding month. The date for submission and data date may be adjusted to accommodate regularly scheduled progress meetings. Submit the monthly updated bar chart on paper and a copy of the updated schedule in electronic format as specified in Section C.2. The Engineer shall "approve" or "reject" the schedule update within 4 days of receipt of the updated CPM schedule. The Engineer may withhold estimates if the updated schedule is not submitted as required by this section. For each updated schedule, identify the actual start and finish dates for all completed activities and the actual start date and remaining duration for all activities in progress. Correct out-of-sequence progress listings generated by the Scheduling Statistics Report on the critical path. The project schedule may be reviewed at each monthly progress meeting. Any corrections shall be made prior to the next monthly progress meeting.
   Submit the following with each updated schedule:

   i. A hard copy of the update in CPM Format
   ii. Provide a written narrative that identifies any changes or shifts in the critical path and submit reasons for the changes or shifts in the critical path
   iii. Resource Curve (If requested by the Engineer)
   iv. A hard copy of the Six Week Look Ahead Schedule in CPM Format (If requested by the Engineer)
   v. Logic Diagram (If requested by the Engineer)
   vi. Activity ID Sort (If requested by the Engineer)
   vii. Total Float Sort (If requested by the Engineer)
   viii. Detailed Predecessor/Successor Sort (If requested by the Engineer)
   ix. Schedule Statistics Report (If requested by the Engineer)
   x. Electronic files (formatted as described above)

2. Late Completion Monthly Update Schedule. A Late Completion Monthly Update Schedule is defined as a monthly update schedule submitted by the Contractor in which the Finish Date exceeds the Contract Completion Date. In the event the Finish Date is more than 14 days beyond the current contract completion date and a schedule revision is not warranted, the Contractor must proceed in accordance with Section H.

E. Revisions. The Work may require, and/or the Contractor may make revisions to the CPM schedule. Addition of new activities or new calendars or changes to existing activities, calendars or logic constitute a revision. All revisions must be reported in narrative form on a cover sheet accompanying the monthly update schedule. Any revision that modifies the critical path or impacts an interim date or project completion date must be represented on a companion schedule submitted with the monthly update schedule or as a fragnet within the monthly update schedule. A fragnet is defined as the sequence of new activities that are proposed to be added to the

existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. If submitted as a fragnet, the Contractor shall compute two Finish Dates. The first Finish Date shall be computed without consideration of any impact by the fragnet. The second Finish Date shall be computed with consideration of any impact by the fragnet. The Contractor shall also submit a written narrative stating the reason for the proposed revisions. The Engineer shall "approve" or "reject" proposed revisions within ten days of receipt of appropriate schedules and narrative. All approved revisions will be incorporated into the Monthly Update Schedule, which will become the Revised Monthly Update Schedule.

F. Time Extensions for Delays in Accordance with 108.06.B and 108.06.D of the Cuyahoga County Engineer's General Provisions. The Work may require, and/or the Contractor may request an extension of the Completion Date. Perform the following analysis to compute the duration of the time extension. Submit two paper copies and two electronic copies of each analysis performed.

1. Determine project progress prior to circumstance(s) necessitating the time extension. The previous accepted monthly update, updated to the date of the circumstance alleging to have caused delay, shall be used to display the prior progress of the project. This schedule is referred to as the Un-impacted Schedule

2. Prepare a fragmentary network (fragnet) depicting the circumstance that is believed to have delayed the project.

3. Insert the fragnet into the Un-impacted Schedule, run the schedule calculations and determine the finish date. This schedule is referred to as the Impacted Schedule.

4. Compare the Impacted Schedule finish date with the Un-impacted Schedule finish date in order to determine the duration of any warranted time extension.

Submit the impacted schedule with the request for time extension. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates. All approved time extensions will be incorporated into the monthly update with the fragnet used to determine impacts incorporated into the schedule.

G. Weather Days in Accordance with 108.06.C of the Cuyahoga County Engineer's General Provisions. The Contractor may request, and/or the Engineer will determine an extension of the completion date due to weather days. Perform the following analysis to compute the duration of the time extension. Submit two paper copies and two electronic copies of each analysis performed.

1. The previously accepted monthly update shall be used to display progress of the project and planned activities for the next 30-day period that incurred weather days. Make a copy of the schedule file to use for the analysis. This schedule is referred to as the Non-weather Schedule.

2. Prepare a list of weather days believed to have delayed the project and the activities that were impacted.

3. Utilizing the calendar(s) of those impacted activities, remove any planned weather days. Insert the weather day(s) into the calendar(s) for the planned work as a non-work day. Run the schedule calculations and determine the finish date. This schedule is referred to as the Weather Schedule.

4. Compare the Weather Schedule finish date with the Non-weather Schedule finish date in order to determine the duration of any warranted time extension.

Submit the weather schedule with the request for time extension on a monthly basis. Include a narrative report describing the effects of weather days to interim and contract completion dates.

H. Recovery Schedule. If the Monthly Update Schedule or Revised Monthly Update Schedule projects a finish date for the Project more than 14 calendar days later than the current Completion Date, submit a recovery schedule showing a plan to finish by the current Completion Date if requested by the Engineer. The County will withhold Estimates until the Engineer approves the recovery schedule. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the Contractor. In the event the current Completion Date is in dispute, the recovery schedule will need to be submitted once the dispute has been resolved.

I. Basis of Payment. The County will make partial payments according to Section 109.09 of the Cuyahoga County Engineer's General Provisions and as modified by the following schedule:

1. The County will release 60 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after the Engineer has approved the CPM Baseline schedule submission.

2. The County will release an additional 30 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 50 percent of the original contract amount is complete.

3. The County will release the remaining 10 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 90 percent of the original contract amount is complete.

The County will pay for the accepted quantities at the contract price as follows:

Item	Ext	Unit	Description
Special	10830000	Lump Sum	CPM Progress Schedule Short Duration Projects

CRITICAL PATH METHOD PROGRESS SCHEDULE

A. General. The progress schedule required for this project is the critical path method schedule (CPM schedule). The Contractor shall designate a Schedule Representative who shall be responsible for coordinating with the Engineer during the preparation and maintenance of the schedule. The requirements of this note replace the progress schedule requirements in 108.03 of the Cuyahoga County Engineer's General Provisions. The contractor shall submit an interim schedule followed by a baseline schedule, or only a baseline schedule, depending on when the contractor starts work as described below.

B. Interim Schedule. If the Contractor starts work within 60 days of execution of the contract, they shall submit an interim schedule. The interim schedule can be in bar chart format or CPM schedule format. The interim schedule shall include detailed activities for the work to be accomplished during the first 90 days of the Contract, and summary activities for the balance of the work.

C. Baseline Schedule. The Contractor shall submit a baseline schedule within 60 days of the execution of the Contract. The baseline schedule will be in CPM schedule format and as described below. The Engineer will review the baseline schedule and will either "approve", "approve as noted" or "reject" the schedule within 21 days of receipt. If the Engineer does not provide written notification regarding the disposition of the baseline schedule within 21 days, the submission will be considered approved.

For baseline schedules that are "approved as noted", the Contractor shall make the necessary revisions and resubmit the revised schedule within 14 days. The Engineer will only reject baseline schedules that do not comply with contract requirements.

For baseline schedules that are "rejected", the Engineer shall indicate in writing all portions of the schedule that do not comply with the contract requirements. The Project Engineer shall conduct a mandatory meeting with the Contractor and the Contractor's Schedule Representative within 14 days of the Engineer's written notice. The purpose of this meeting is to resolve all issues with the baseline schedule. At this meeting, the Contractor shall provide clarification and all requested information necessary for the Engineer to "approve" the baseline schedule.

In the event the baseline schedule is not "approved" within 120 days of execution of the contract, all work shall cease on the project until the baseline schedule is "approved".

Approval of the baseline schedule does not revise the Contract Documents. The baseline schedule must be "approved" or "approved as noted" by the Engineer prior to the Engineer evaluating any contractor claims associated with time impacts.

1. Schedule Requirements. Generate the baseline schedule using P6 Project Planner by Primavera Systems Inc., Bala Cynwyd, PA.

   Provide a working day schedule that shows the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project by the

Original Contract Completion Date. Show the order and interdependence of activities and the sequence for accomplishing the work. Describe all activities in sufficient detail so that the Engineer can readily identify the work and measure the progress of each activity. The baseline schedule must reflect the scope of work, required phasing, maintenance of traffic requirements, interim completion dates, the Completion Date, and other project milestones established in the Contract Documents. Include activities for submittals, working drawings, shop drawing preparation/submittal, County's review time for the shop drawings, material procurement and fabrication, and the delivery of materials, plant, and equipment, and other similar activities.

The Contractor shall be responsible for assuring all work, including all subcontractor work, is included in the schedule. The Contractor shall be responsible for assuring that all work sequences are logical and that the schedule indicates a coordinated plan.

Failure by the Contractor to include any element of work required for performance of the Contract shall not excuse the Contractor from completing all work within the required time. The Engineer's review of the baseline schedule will be for compliance with the specifications and contract requirements. Approval by the Engineer will not relieve the Contractor of any of their responsibilities for the accuracy or feasibility of the schedule. Omissions and errors will be corrected as described in Section F or I in this note and will not affect contract time.

a) Administrative Identifier Information:

1. County Road Name / Route Number
2. Project Limits
3. PID Number
4. Contract Notice to Proceed Date
5. Completion Date
6. Contractor's Name
7. Contractor's Dated Signature
8. County Dated Approval Signature

b) Project Activities:

i. Activity Identification (ID). Assign each activity a unique identification number. Activity ID length shall not exceed 10 characters. Once accepted, the Activity ID shall be used for the duration of the project.

ii. Activity Description. Each activity shall have a narrative description consisting of a verb or work function (e.g.; form, pour, excavate) and an object (e.g.; slab, footing, underdrain).

iii. Activity Original Duration. Assign a planned duration in working days for each activity. Do not exceed a duration of 20 working days for any construction activity unless approved by the Engineer. Do not represent the maintenance of traffic, erosion control, and other similar items as single activities extending to the Completion Date. Break these Contract Items into component activities in order to meet the duration requirements of this paragraph.

iv. Activity Relationships:

- All activities, except the first activity, shall have a predecessor(s). All activities, except the final activity, shall have a successor(s).

- Use only finish-to-start relationships with no leads or lags to link activities or use start-to-start relationships with lags no greater than the predecessor duration to link activities.

- Use of finish-to-finish relationship is permitted when both activities are already linked with a start-to-start relationship.

c) Project Milestones:

i. Start Project: The Contractor shall include as the first milestone in the schedule, a milestone named “Start Project”. The date used for this milestone is the date the contract is executed and signed by the County.

ii. End Project Milestone: The Contractor shall include as the last activity in the project schedule, a milestone named “End Project”. The date used for this milestone is considered the project completion date.

iii. Start Phase Milestone: The Contractor shall include as the first activity for a project phase, an activity named "Start Phase X", where "X" identifies the phase of work. The Contractor may include additional milestones but, as a minimum, must include all contractual milestones.

iv. End Phase Milestone: The Contractor shall include as the last activity in a project phase, an activity named "End Phase X" where "X" identifies the phase of work. The Contractor may include additional milestones, but at a minimum contractual milestones.

d) Hammock:

Use hammocks to show the duration of specified contract work periods, phases and road closures. The hammock activity type is allowed to have a start-to-start relationship with the first activity in a series of activities and a finish-to-finish relationship with the last activity in a series of activities.

e) Constraints:

Use constraints sparingly in the schedule. If constraints are used, use only Early Constraints or Late Constraints.

f) Weather and Seasonal Conditions:

The winter shutdown periods shall be shown using non-work calendars. The activity can be assigned to a calendar indicating times of non-work. These custom calendars can be created to show days, weeks, or months of non-work. Weather and seasonal conditions, as shown in Table 108.06-1 of the Cuyahoga County Engineer's General Provisions, shall be evenly dispersed into the CPM schedule calendars as non-work days and be included in the planning and scheduling of all work.

g) Linking Projects:

Independent projects shall not be linked using Primavera's Interproject Relationship Manager Application.

h) Activity Codes:

The Contractor shall, at a minimum, include Project Activity Codes for Area, Phase, and Responsibility for each activity.

i) Resource Loading:

Each Activity shall be loaded with all resources (labor only) required to complete the activity. Each subcontractor's resources shall be loaded independently so that they may be reviewed separately.

j) Schedule Options:

The schedule may only be calculated using retained logic. Show open ends as non-critical. Schedule durations are to be contiguous. Total float shall be calculated as finish float. Ignore relationships to and from other projects.

2. Submission Requirements. Submit all schedules within the time frames specified. Submit the schedule and information in electronic file format via email or compact disc (CD) compatible with the Engineer's computer. Submit the following information along with the electronic baseline schedule:

a) A baseline schedule in CPM format including the Administrative Identifier Information discussed in Section C.1.a on the first page of the schedule. For each activity on the chart, indicate the Activity ID, Activity Description, Original Duration,

Remaining Duration, Total Float, Start Date, Finish Date, and Calendar ID. Use arrows to show the relationships among activities.

b) A baseline schedule in CPM format, on paper. Identify the critical path of the project on the bar chart in red. The critical path is defined as the longest path of activities in the project that determines the project completion date. The activities that make-up the critical path of activities is the "Critical Activities."

c) Resource Curve – This curve shall graphically show both the average daily manpower each week and the cumulative resource usage (manpower only). The daily manpower shall be shown using stacked bars with each subcontractor represented by a different color.

d) A Six Week Look Ahead Schedule in CPM format (If requested by the Engineer). This schedule will have all the requirements of the baseline schedule in CPM format except that it shall be limited to those activities that have an early start or early finish within a six-week period of the data date.

e) A Scheduling Statistics Report (If requested by the Engineer). Submit a report of baseline schedule statistics, including number of activities, number of activities on the longest path, number of started activities, number of completed activities, number of relationships, percent complete, and number and type of constraints.

f) A Logic Diagram (If requested by the Engineer). Submit a diagram in PERT chart format showing the logic of the baseline schedule.

g) An Activity ID Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule sorted by ascending Activity Identification Number.

h) A Total Float Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule sorted by increasing total float and by early start date.

i) A Detailed Predecessor/Successor Sort (If requested by the Engineer). Submit a listing of all activities included in the baseline schedule indicating the activities that immediately precede and immediately succeed that activity in the schedule logic.

D. Float. Use of float suppression techniques, such as; preferential sequencing (arranging critical path through activities more susceptible to County caused delay), lag logic restraints, zero total or free float constraints, extending activity times, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates.

1. Definitions of Float: Total Float is the length of time along a given network path that the actual start and finish of activity(s) can be delayed without delaying the project completion date. Project Float is the length of time between the End Project Milestone and the Contract Completion Date.

2. Ownership of Float: Float available in the schedule, at any time shall not be considered for the exclusive use of either the County or the Contractor. During the course of contract execution, any float generated due to the efficiencies of either party is not for the sole use of the party generating the float; rather it is a shared commodity to be reasonably used by either party. Efficiencies gained because of favorable weather within a calendar month, where the number of days of normally anticipated weather is less than expected, will also contribute to the Project Float. A schedule showing work completing in less time than the contract time, and accepted by the County, will be considered to have Project Float. Project Float will be a resource available to both the County and the Contractor. No time extensions will be granted nor delay damages paid unless a delay occurs which impacts the project's critical path, consumes all available float and extends the work beyond the Contract Completion Date.

3. Negative Float: Negative float will not be a basis for requesting time extensions. Any extension of time will be addressed in accordance with the Section F. Scheduled completion date(s) that extend beyond the contract (or phase) completion date(s) may be used in computations for assessment of liquidated damages. The use of this computation is not to be construed as an order by the County to accelerate the project.

E. Monthly Update Schedule. A monthly update schedule is a schedule in which only progress is updated from the prior data date to the current data date. Work added, and/or excusable delays encountered since the prior data date must be represented as a schedule revision as described in Section F.

1. Update Requirements. On the tenth day of the current month, during the life of the Project, submit an updated schedule and all required information with a data date of the last day of the preceding month. The date for submission and data date may be adjusted to accommodate regularly scheduled progress meetings. Submit the monthly updated bar chart on paper and a copy of the updated schedule in electronic format in Section C.2. The Engineer shall “approve” or “reject” the schedule update within 5 days of receipt of the updated CPM schedule. The Engineer may withhold estimates if the updated schedule is not submitted as required by this section. For each updated schedule, identify the actual start and finish dates for all completed activities and the actual start date and remaining duration for all activities in progress. Correct out-of-sequence progress listings generated by the Scheduling Statistics Report on the critical path. The project schedule shall be reviewed at each monthly progress meeting. Any corrections shall be made prior to the next monthly progress meeting.

   Submit the following with each updated schedule:

   i. CPM Schedule in Bar Chart Format

   ii. Provide a written narrative that identifies any changes or shifts in the critical path and submit reasons for the changes or shifts in the critical path

iii. Resource Curve (If requested by the Engineer)

iv. A hard copy of the Six Week Look Ahead Schedule in CPM Format (If requested by the Engineer)

v. Logic Diagram (If requested by the Engineer)

vi. Activity ID Sort (If requested by the Engineer)

vii. Total Float Sort (If requested by the Engineer)

viii. Detailed Predecessor/Successor Sort (If requested by the Engineer)

ix. Schedule Statistics Report (If requested by the Engineer)

x. Electronic files (formatted as described above)

2. Late Completion Monthly Update Schedule. A Late Completion Monthly Update Schedule is defined as a monthly update schedule submitted by the Contractor in which the Finish Date exceeds the Contract Completion Date. In the event the Finish Date is more than 14 days beyond the current contract completion date and a schedule revision is not warranted, the contractor must proceed in accordance with Section I.

F. Revisions. The Work may require, and/or the Contractor may revise the CPM schedule. Addition of new activities or new calendars or changes to existing activities, calendars or logic constitute a revision. All revisions must be reported in narrative form on a cover sheet accompanying the monthly update schedule. Any revision that modifies the critical path or impacts an interim date or project completion date must be represented on a companion schedule submitted with the monthly update schedule or as a fragnet within the monthly update schedule. A fragnet is defined as the sequence of new activities that are proposed to be added to the existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. If submitted as a fragnet, the Contractor shall compute two Finish Dates. The first Finish Date shall be computed without consideration of any impact by the fragnet. The second Finish Date shall be computed with consideration of any impact by the fragnet. The Contractor shall also submit a written narrative stating the reason for the proposed revisions. The Engineer shall “approve” or “reject” proposed revisions within ten days of receipt of appropriate schedules and narrative. All approved revisions will be incorporated into the Monthly Update Schedule, which will become the Revised Monthly Update Schedule.

G. Time Extensions for Delays in Accordance with 108.06.B and 108.06.D of the Cuyahoga County Engineer’s General Provisions. The Work may require, and/or the Contractor may request an extension of the Completion Date. Perform the following analysis to compute the duration of the time extension. Submit two paper copies and two electronic copies of each analysis performed.

1. Determine project progress prior to circumstance(s) necessitating the time extension. The previous accepted monthly update, updated to the date of the circumstance alleging to have caused delay, shall be used to display the prior progress of the project. This schedule is referred to as the Un-impacted Schedule

2. Prepare a fragmentary network (fragnet) depicting the circumstance that is believed to have delayed the project.

3. Insert the fragnet into the Un-impacted Schedule, run the schedule calculations and determine the finish date. This schedule is referred to as the Impacted Schedule.

4. Compare the Impacted Schedule finish date with the Un-impacted Schedule finish date in order to determine the duration of any warranted time extension.

Submit the impacted schedule with the request for time extension. Include a narrative report describing the effects of new activities and relationships to interim and contract completion dates. All approved time extensions will be incorporated into the monthly update with the fragnet used to determine impacts incorporated into the schedule.

H. Weather Days in Accordance with 108.06.C of the Cuyahoga County Engineer's General Provisions. The Contractor may request, and/or the Engineer will determine an extension of the completion date due to weather days. Perform the following analysis to compute the duration of the time extension. Submit two paper copies and two electronic copies of each analysis performed.

1. The previously accepted monthly update shall be used to display progress of the project and planned activities for the next 30-day period that incurred weather days. Make a copy of the schedule file to use for the analysis. This schedule is referred to as the Non-weather Schedule.

2. Prepare a list of weather days believed to have delayed the project and the activities that were impacted.

3. Utilizing the calendar(s) of these impacted activities, remove any planned weather days. Insert the weather day(s) into the calendar(s) for the planned work as a non-work day. Run the schedule calculations and determine the finish date. This schedule is referred to as the Weather Schedule.

4. Compare the Weather Schedule finish date with the Non-weather Schedule finish date in order to determine the duration of any warranted time extension.

Submit the weather schedule with the request for time extension on a monthly basis. Include a narrative report describing the effects of weather days to interim and contract completion dates.

I. Recovery Schedule. If the Monthly Update Schedule or Revised Monthly Update Schedule projects a finish date for the Project more than 14 calendar days later than the current Completion Date, submit a recovery schedule showing a plan to finish by the current Completion

Date if requested by the Engineer. The County will withhold Estimates until the Engineer approves the recovery schedule. The Engineer will use the schedule to evaluate time extensions and associated costs requested by the Contractor. In the event the current Completion Date is in dispute, the recovery schedule will need to be submitted once the dispute has been resolved.

J. Basis of Payment. The County will make partial payments according to 109.09 of the Cuyahoga County Engineer's General Provisions and as modified by the following schedule:

1. The County will release 60 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after the Engineer has approved the CPM Baseline schedule submission.

2. The County will release an additional 30 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 50 percent of the original contract amount is complete.

3. The County will release the remaining 10 percent of the lump sum amount bid for CPM Progress Schedule to the Contractor with the first regular estimate payable after 90 percent of the original contract amount is complete.

The County will pay for the accepted quantities at the contract price as follows:

Item	Ext.	Unit	Description
Special	10810000	Lump Sum	CPM Progress Schedule

ITEM SPECIAL - PROJECT DVD RECORDING

General

This work shall consist of providing a professional quality audio and video DVD recording of the project prior to the start of any construction to supplement the documentation of existing site conditions.

Construction shall not start until the area has been recorded and the DVD's are submitted to and approved by the engineer.

The pre-construction DVD recording shall be performed by independent companies having previous experience recording similar type projects for municipal, county or state agencies. The name of the company along with a listing of recent projects/clients/experience must be submitted to the engineer for approval prior to engaging in the work. All DVD recording shall be conducted in the presence of the engineer unless waived in writing by the engineer. Amateur videos/recordings will not be acceptable.

Materials

The final product shall be first generation digital DVD format with full color and audio.

The audio/video shall be recorded digitally directly onto DVD disk(s). The recording shall not be transferred onto a computer for burning to DVD; it shall be recorded directly to DVD disk(s). Recordings made onto VHS tape then transferred to DVD will not be accepted.

Information

Audio: Audio description shall be made simultaneously with and support the video coverage. Each DVD shall begin with the current date, time, project name, and municipality and be followed by the general location (i.e., Name of street, building or property owner), viewing side, and direction of progress. The project plan sheet numbers or stationing shall be noted on the audio track. Special notations for unusual features, conditions or items along the project shall be identified audibly by an approximate station location and/or address, when available.

Date and time: All DVD recordings shall continuously display the month, day, year, hours, minutes and seconds by electronic means.

Location: All DVD's (disks and cases) shall be properly identified by DVD number, location and project name in a manner acceptable to the County.

Houses and buildings shall be identified visually by house or building number, when possible, in such a manner that the progress of the recording may be located by reference to the houses and buildings.

The stationing numbers must be continuous, correspond to the project stationing, and include the standard engineering symbols (for example: 37+25). This information must appear in the lower half of the viewing screen. Below the project stationing shall appear the name of the project, name of the area covered, direction of travel, viewing side, etc.

All DVD's are to be accompanied by a notarized statement verifying the original unedited quality of the DVD's.
Coverage

General: Recorded coverage shall include, but not be limited to, all existing driveways and aprons, sidewalks, curbs, ditches (note drainage patterns), streets (note pavement condition), landscaping, trees, culverts, catch basins, headwalls, retaining walls, fences, manholes, valve boxes, visible utilities, monuments and all buildings located within the zone of influence of construction. Of particular concern are existing faults, fractures, defects, or other imperfections exhibited by the above referenced features, especially as they relate to items/areas that are not to be removed or otherwise disturbed during construction, and for disturbed areas which must be restored to their original condition.

Work limits: The overall construction area work limits shall be recorded for the full width within the zone of influence of construction. Also, include in coverage any areas intended to be used for construction access, storage or waste disposal.

Specifically

Streets shall be recorded for the full width of the road, except where specifically noted otherwise by the engineer.

Easement areas shall be recorded for the full width of the permanent and temporary easements and all other adjacent areas lying within the zone of influence of construction as determined by the engineer.

Building exteriors: the contractor shall furnish full color, with audio, DVD recordings of all exterior surfaces of buildings located within the zone of influence of construction and specifically identified by the engineer to receive such coverage. Buildings so identified may include houses, apartments, warehouses, retail stores and other structures. Exterior building coverage shall include, but not be limited to, walls, visible foundations, chimney, porches and trim.

Recording Conditions

All recording shall be done during times of good visibility.

No outside recording shall be done during periods of visible precipitation or when the ground area is covered with snow, leaves or debris.

Lighting: In order to produce the proper detail and perspective, adequate auxiliary lighting will be required to fill in shadow areas caused by trees, utility poles, road signs, and other such objects, as well as other conditions requiring artificial illumination.

Rate of Speed: The average rate of speed in the direction of travel during recording shall not exceed forty-eight (48) feet per minute. Panning rates and zoom-in/ zoom-out rates shall be controlled sufficiently such that playback will produce adequate clarity of the objects being viewed. The DVD recorder is encouraged to provide sample playbacks for approval by the engineer prior to substantial completion of the DVD recording.

Distance: When conventional wheeled vehicles are used as conveyances for recording, the distance from the camera lens to the ground shall not be less than eight (8) feet to insure proper perspective. In instances where recorded coverage will be required in areas not accessible to conventional wheeled vehicles, such coverage shall be obtained by walking or by special conveyance approved by the engineer, but with the same requirements for recorded quality and content as specified herein except as may be specifically exempted by the engineer.

Entering Property

If it becomes necessary to enter onto private property, owners will be notified on a form prescribed by the County not less than forty-eight hours nor more than thirty days prior to the date of such entry in accordance with provisions of O.R.C. Section 163.03. Contractor shall make restitution or reimbursement for any actual damage resulting to the premises and to improvements or personal property located in, on, along, over or under said premises because of entry for the herein stated purpose.

The contractor is advised that no entry upon private property shall occur until the County determines that the requirements set forth in said code section have been satisfied. The contractor shall be held liable for any entry made contrary to these provisions.

Ownership of DVD's

All DVD's produced will become the permanent property of the County. The contractor shall deliver all DVD's to the County prior to the beginning of any construction work.

Any portion of the DVD coverage deemed unacceptable by the engineer must be re-recorded by the contractor at no additional charge.

Basis of payment

The full cost of furnishing all labor, material and equipment to perform the required first generation digital DVD recording as described herein shall be included for payment in the lump sum price bid for Item Special - Project DVD Recording.

ITEM SPECIAL – PRECONSTRUCTION PHOTOGRAPHIC PROJECT DOCUMENTATION

General

This work shall consist of providing professional quality, web-based photographic documentation of the project prior to the start of any construction to supplement the documentation of existing site conditions.

The pre-construction photographic documentation shall be performed by independent companies having previous experience providing photographic documentation of similar type projects for municipal, county or state agencies. The name of the company along with a listing of recent projects/client/experience must be submitted to the engineer for approval prior to engaging in the work. All photography shall be conducted in the presence of the engineer unless waived in writing by the engineer. Amateur photography will not be acceptable.

PART 1 – SUMMARY

A. This Section provides for:

1. Comprehensive digital photographic documentation of the project prior to the start of any construction.

2. Documentation inclusive of electronic indexing, navigation, storage and remote access throughout construction.

3. Contractor support, security of information and technological requirements related to the documentation.

4. Qualifying credentials required by Contractor.

PART 2 – REQUIRED DOCUMENATION ELEMENTS

A. Photo indexing and navigation system will utilize actual construction drawings or equivalent as the basis for an interactive on-line interface. For all documentation referenced herein, indexing and navigation must be organized by both time (date-stamped) and location throughout the Project.

B. Documentation will combine indexing and navigation system with inspection-grade high-resolution digital photography designed to capture actual conditions prior to construction. Documentation will be accessible on-line through use of an Internet connection during construction. Documentation will allow for multiple-user access, simultaneously, on-line. Access shall adhere to industry standards for information security and protection of

data. Multi-tiered access levels shall be achievable through use of individual passwords, if applicable.

C. Prior to construction, the entire project (including, but not limited to), all abutting streets, parkways, driveways and aprons, curbs, sidewalks, ditches, landscaping, trees, headwalls, retaining walls, fences, monuments, impacted & adjacent utilities and adjacent structures surrounding the project shall be documented. Overlapping photographic techniques will be used to insure maximum coverage. Indexing and navigation accomplished through interactive architectural drawings. This documentation is required immediately prior to construction.

D. Miscellaneous events captured by the Engineer independently, will be dated, labeled and inserted into a Section in the navigation structure entitled "Slideshows," allowing this information to be stored in the same "place" as the formal scope.

E. Customizable project-specific digital photographic documentation of other details or milestones. Indexing and navigation accomplished through interactive engineering plans.

F. Any portion of the photographic coverage deemed unacceptable by the Engineer must be reshot by the contractor at no additional charge.

G. If it becomes necessary to enter upon private property, owners will be notified on a form prescribed by the County not less than forty-eight hours nor more than thirty days prior to the date of such entry in accordance with provisions of O.R.C. Section 163.03. Contractor shall make restitution or reimbursement for any actual damage resulting to the premises and to improvements or personal property located in, on, along, over, under said premises because of entry for the herein stated purpose. The contractor is advised that no entry upon private property shall occur until the County determines that the requirements set forth in said code section have been satisfied. The contractor shall be held liable for any entry made contrary to these provisions.

PART 3 – PROJECT SCOPE OF WORK (SPECIFIC DIGITAL PHOTOGRAPHIC SHOOT TYPES, FREQUENCIES AND CUSTOMIZATIONS TO BE AS RECOMMENDED BY THE PROVIDER OF THIS SERVICE)

(Insert project description from Title Sheet and/or add specific project requirements)

Note that the scope of this work only involves pre-construction documentation and does not include any documentation during construction of this project.

PART 4 – SUPPORT; HOSTING; COUNTY ACCESS; COUNTY USAGE RIGHTS; AND DELIVERABLES

A. Furnish all on-line domain/web hosting, industry standard security measures and redundant server backup of the documentation.
B. Furnish any software required for all indexing, navigation, hosting and remote access (excepting web browsers).

C. Furnish technical support related to using the system or service.

D. Create off-line or stand-alone (on-site) version of entire documentation platform required by this specification, if applicable, for high security or sensitive facilities.

E. Upon completion of the Project, provide final copies of the documentation (the "Permanent Record") with the underlying housing software, indexing and navigation system embedded in a digital media format, typically a DVD or external hard-drive. On-line access shall be available until delivery of the Permanent Record or as agreed by the Engineer in writing. Intellectual property rights associated with the digital media prepared in direct service of the project shall transfer, along with the media itself, to the County. One multiple-user license for use of the underlying housing software, indexing and navigation is included for accessing the digital media.

PART 5 – QUALIFICATIONS

A. Demonstrable minimum experience of five (5) years in operation providing expert and independent third party digital photography construction documentation using advanced indexing/navigation systems.

B. Representative portfolio of *completed* construction projects of similar type, size, duration and complexity as the Project.

C. At least three (3) references may be required.

Basis of Payment

The full cost of providing all labor, material and equipment to perform the required Preconstruction Project Documentation including all photography, web-based storage and access and final deliverables as described herein be included in the lump sum bid for Item Special – Preconstruction Photographic Project Documentation.

COMPUTERIZED BID SHEET

The Cuyahoga County Department of Public Works has provided an Excel spreadsheet of the itemized unit price bid sheets on its Internet website which may be downloaded from that location for use by the bidder:

http://publicworks.cuyahogacounty.us/en-US/Notice-Bidders.aspx

The spreadsheet contains formulas for the extensions, subtotals, and totals which have been tested with sample data for accuracy. However, be advised that the bidder is solely responsible for preparing his bid sheets and verifying the correctness of the calculations. The accuracy of any formulas included in a spreadsheet provided by the Cuyahoga County Department of Public Works is not guaranteed.

If used by the bidder, this spreadsheet must be printed on 8½" by 11" paper and be submitted with the proposal. Submission of the unit price bid sheets in electronic form will **not** be permitted.

UTILITY NOTE

CUY-OLD ROCKSIDE ROAD
REPLACEMENT OF EXISTING BRIDGE 00.42
OVER THE CUYAHOGA RIVER
IN THE CITY OF INDEPENDENCE AND VILLAGE OF VALLEY VIEW
PID No. 91563
FAN E120(225)

Bidders are advised that the following utility facilities may not be cleared from the construction area at the time of award of the contract. These utility facilities shall remain in place or be relocated within the construction limits of the project as set out below.

The Contractor shall appropriately coordinate and give adequate notification to the utility owners whose castings require adjustment or whose facilities require relocation during construction so as not to conflict with the Contractor's schedule of operations. Utility contact information is included in the general notes on sheet 7/157 of the project plans.

All station locations listed are approximate unless otherwise stated.

AT&T Ohio, Inc. (AT&T)

The Contractor shall be aware there are AT&T aerial facilities on First Energy and AT&T utility poles along the north side of Old Rockside Road. These lines are to be relocated by AT&T after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when working in the vicinity of the aerial lines. AT&T relocation is anticipated to take One Hundred and Twenty (120) calendar days after First Energy has completed their work. AT&T will relocate their lines to the permanent poles erected by First Energy and AT&T after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

AT&T will replace one (1) pole (#110204), located at the northeast corner of the bridge.

Charter Communications

The Contractor shall be aware there are Charter aerial facilities on First Energy utility poles along the north side of Old Rockside Road. These lines are to be relocated by Charter after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when

working in the vicinity of the aerial lines. Charter relocation is anticipated to take seven (7) calendar days after AT&T and First Energy have completed their work. Charter will relocate their lines to the permanent poles erected by First Energy after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

City of Cleveland Division of Water (CWD)

The Contractor shall be aware there is an existing 12" diameter water main located south of the existing bridge and runs along the south edge of Old Rockside Road west of the bridge and transitions from the south edge of Old Rockside Road to the north edge of Old Rockside Road east of the bridge. The 12" water main will be relocated by the contractor as part of this project from STA. 33+15.00 (BL Construction Old Rockside Road) to STA. 35+35.28 (BL Construction Old Rockside Road). The Contractor shall use caution when working in the vicinity of the existing water mains.

The water work will be constructed first, during the Pre-Phase described in the construction plans, prior to the beginning of phase construction. The existing 12" water main will remain in service during the installation of the proposed 12" water main.

Crown Castle Fiber (CCF)

The Contractor shall be aware there are CCF aerial facilities on First Energy utility poles along the north side of Old Rockside Road. These lines are to be relocated by CCF after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when working in the vicinity of the aerial lines. CCF relocation is anticipated to take seven (7) calendar days after AT&T and First Energy have completed their work. CCF will relocate their lines to the permanent poles erected by First Energy after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

Dominion Energy Ohio (DEO)

The Contractor shall be aware there is an existing 3" gas line within the project limits. The gas line runs along the north edge of Old Rockside Road west of and along the bridge. The gas line crosses from the north side of the road to the south side near STA 33+30 (BL Construction Old Rockside Road) and runs along the south edge of Old Rockside Road until STA 35+35 where it crosses back to the north side of Old Rockside Road and then continues north along the west side of West Canal Road. A portion of the gas line within the project limits will be temporarily and permanently relocated.

Prior to construction commencing, DEO will abandon a portion of their gas line east and west of the bridge. The portion of the gas line between the Cuyahoga Valley Scenic Railroad (CVSR) tracks and the CVSR driveway will be relocated south. The portion of the gas line between the east end of the bridge and West Canal Road will be relocated north. New tie-in locations will be established for use in later phases.

Once the temporary road is constructed and temporary bridge is erected, a temporary gas line will be run along the north side of the temporary road and placed on supports connected to the north side of the temporary bridge. Once the temporary gas line is in service the existing gas line will be abandoned between the tie-in points constructed in the previous phase. DEO's contractor will coordinate their work with the successful bidder. It is anticipated to take fourteen (14) calendar days for DEO's contractor to complete their work for this phase.

Utility supports and casing pipe for the permanent bridge are not shown in the construction plans. They shall be erected by the DEO contractor after the bridge superstructure is erected. DEO's contractor will coordinate their work with the successful bidder. A sleeve will be placed in the semi-integral diaphragms to allow the permanent gas line to pass through the diaphragms. Once the supports, casing pipe and sleeve are constructed, the Contractor shall notify DEO that the permanent gas line can be installed. The permanent gas line shall be installed prior to placing any final pavement. The installation of the permanent gas line and connection to the previously constructed tie-in locations, not including the time to erect the utility supports and casing pipe, is anticipated to take fourteen (14) calendar days.

Once the permanent gas line is in service, DEO will remove the temporary gas line from the temporary bridge and along the temporary road. It is anticipated to take fourteen (14) calendar days for DEO's contractor to complete their work for this phase.

Everstream Solutions

The Contractor shall be aware there are Everstream aerial facilities on First Energy utility poles along the north side of Old Rockside Road. These lines are to be relocated by Everstream after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when working in the vicinity of the aerial lines. Everstream relocation is anticipated to take Seven (7) calendar days after AT&T and First Energy have completed their work. Everstream will relocate their lines to the permanent poles erected by First Energy after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

First Energy

The Contractor shall be aware there are First Energy aerial facilities on utility poles along the north side of Old Rockside Road. These lines are to be relocated by First Energy. See the attached First Energy Utility Note for work involving First Energy facilities.

The Contractor shall exercise caution when working in the vicinity of the aerial lines. First Energy line shop requires a lead time of a minimum of 12 weeks plus engineering. These lines will be in service and ENERGIZED during construction. Deenergizing may be possible, but is not guaranteed, and is subject to lead times and system conditions. The wires will not be dropped and may be returned to service if needed with 2 hours notice to the contractor. The lines operate at less than 50kV. The Contractor shall be aware of the standard clearances required by OSHA and the owner of the electrical lines.

First Energy will erect temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. First Energy relocation is anticipated to take thirty (30) calendar days. First Energy will relocate their lines to the permanent poles erected after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed. First Energy relocation is anticipated to take thirty (30) calendar days.

Verizon

The Contractor shall be aware there are Verizon aerial facilities on First Energy utility poles along the north side of Old Rockside Road. These lines are to be relocated by Verizon after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when working in the vicinity of the aerial lines. Verizon relocation is anticipated to take seven (7) calendar days after AT&T and First Energy have completed their work. Verizon will relocate their lines to the permanent poles erected by First Energy after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

Windstream

The Contractor shall be aware there are Windstream aerial facilities on First Energy utility poles along the north side of Old Rockside Road. These lines are to be relocated by Windstream after First Energy erects the temporary poles on the north side of the temporary roadway and bridge. The relocation will occur prior to the contractor commencing work on the temporary roadway and bridge. The Contractor shall exercise caution when working in the vicinity of the aerial lines. Windstream relocation is anticipated to take seven (7) calendar days after AT&T and First Energy have completed their work. Windstream will relocate their lines to the permanent poles erected by First Energy after the permanent bridge and roadway are open to traffic and the temporary bridge and roadway have been removed.

GENERAL

The Contractor must exercise caution when working in proximity to the existing and/or relocated utility facilities.

Sections 105.07 and 107.16 of the Cuyahoga County Engineer's General Provisions require that the contractor cooperate with all utilities located within the limits of this construction project and take responsibility for the protection of the utility property and services.

If the Contractor is directed by a utility company to perform any work not specifically contained in the plans or proposal, the County will not compensate the Contractor for this work unless the County approves the request in writing before the work begins. If the work is not pre-approved by the County, the Contractor will be responsible for obtaining reimbursement for its work from the utility company, which directed the contractor to perform the work.

In the event that the Contractor requests that additional work, not specifically contained in the plans or proposal, be performed by a utility company, the Contractor will be responsible for reimbursing the utility company for the additional work unless the County has agreed in writing to pay for the additional work before the work begins.

the Illuminating Company
A FirstEnergy Company

Northern Region Engineering Services Utility Note
Project Response for Old Rockside Rd. Bridge

Reference Illuminating Company File – WR # 60230602

9-29-20

Attention: David Leake

The following information indicates the Illuminating Company's findings after examining the information previously received by the Illuminating Company on 9-25-20 for the mentioned project.

☐ 1. The Illuminating Company has no facilities in conflict on this project.

☒ 2. The Illuminating Company has facilities in conflict and will be required to modify them.

☐ 3. Based upon plans or information received, it is not clear that modifying our facilities is necessary. Please provide the additional information requested below.

☐ **4.** The Illuminating Company has facilities very close to, or in conflict with the proposed design and may need to modify them. Redesign or use extreme caution during installation.

I. WOOD-POLE AERIAL **DISTRIBUTION** FACILITIES

Street	Station (approx.)	Pole #	Conflict	Proposed CEI Action	Required County Action
Old Rockside	26+46, 15' LT	803446 (803445 in field)		relocate to 20' LT	
Old Rockside	27+64, 16' LT	103686	temp. roadway	temp relocate to 27+87, 42' LT	Clear trees from path of wires and poles: typical all temporary and permanent pole and wire relocations
Old Rockside		103686	not in ROW	after temp road/bridge removed, return to 27+64, 16' LT	
Old Rockside	29+33, 20' LT	803447	temp. roadway	temp relocate to 29+33, 65' LT	
Old Rockside		803447	not in ROW	after temp road/bridge removed, return to 29+33, 20' LT	

Old Rockside	30+85, 25' LT	803448	temp. roadway bridge and new bridge; construction crane clearance	temp relocate to 30+77, 74' LT	
Old Rockside		803448	not in ROW	after temp road/bridge removed, relocate to 30+90, 18' LT	
Old Rockside	32+62, 27' LT	110204	temp. bridge and new bridge; construction crane clearance	temp relocate to 32+75, 74' LT	
Old Rockside		110204	not in ROW	after temp road/bridge removed, relocate to 32+62, 18' LT	
Old Rockside	34+21, 27' LT	110203	temp. roadway and parking	temp relocate to 34+21, 53' LT	
Old Rockside		110203	not in ROW	after temp road/bridge removed, relocate to 34+21, 21' LT	
Old Rockside	34+21, 22' RT	732675 cable pole	underground primaries		excavate with care
Old Rockside	35+33, 27' LT	803301	temp. roadway	temp relocate to 35+33, 43' LT	
Old Rockside		803301	not in ROW	after temp road/bridge removed, return to 35+33, 27' LT	
Old Rockside		new	locate wires in ROW	After temp road removed install at 35+10, 21' LT	
Old Rockside	2 locations	2 poles	n/a	if deenergizing, add cut outs to expedite emergency reenergizing	

Deenergizing may be possible, is not guaranteed, is subject to the lead times below and system conditions. The wires will not be dropped and may be returned to service if needed with 2 hours notice to the contractor.

Proposed CEI conflict resolution details and estimates are preliminary and are subject to change.

If modifications to Illuminating Co. facilities are required to permit construction activities, be advised the current line shop lead time is 12 weeks + engineering, unless new metered service. Provide written notice for any work to proceed.

II. BELOW-GRADE ELECTRIC **DISTRIBUTION** FACILITIES

No conflicts.

Please forward revised drawings to my attention @ 6896 Miller Rd., Brecksville, Ohio 44141 as they are available for further review. **Notify the Illuminating Co. of any changes to the construction start date.**

De-energizing

Illuminating Company High-Voltage Transmission and Distribution (T&D) lines can not readily or easily be de-energized. They operate under strict Federally-Mandated oversight. De-energizing is a lengthy, costly process, and all other options

must be exhausted prior to considering de-energizing High-Voltage T&D lines. Permission to de-energize may be withheld depending on many factors, including but not limited to: ambient temperature, customer load, possible weather events, and many other contingencies. Further, if de-energizing is ultimately allowed, the High-Voltage T&D lines must remain in a condition that they can be "restored" to service in an emergency. Therefore, any personnel, tools, equipment and all appurtenances must be in a position and condition to move/reposition (within two-hours of notice) into a safe, OSHA-acceptable distance from the High-Voltage T&D lines, and the High-Voltage T&D lines must be considered as energized while steps are taken to re-energize the High-Voltage T&D lines.

Site Preparation

Prior to the Illuminating Company commencing work on aerial or underground facilities in support of roadway, sanitary, storm or water line projects, all clearing, grubbing, necessary forestry (tree/bush trimming) in the Public Right of way is to be completed by others. Final grade shall be established prior to the Illuminating Company installing or relocating underground electric distribution facilities. Also, the project construction limits are to be surveyed and staked by the requesting engineering consulting firm or by the municipality in order ensure the Illuminating Company is properly locating aerial facilities in the public right of way and within the construction limits.

Relocation Costs

Relocation costs that are determined to be compensable, such as, sanitary sewer projects, water lines and other compensable rights or where the relocation of our overhead facilities is only caused by the installation of sidewalks, shall be invoiced by the Illuminating Company per our standard Aid to Construction form. Payment shall be received in advance of work commencing. Estimates are only valid for 30 days and will be re-estimated to provide current estimated costs should approvals be extended beyond the 30 days.

Field Condition Conflicts

In the event additional conflicts are identified which are not part of the Project 4A Note/Project Response Form, due to field conditions, the Illuminating Company shall be notified immediately, both verbally and in writing by the authorized agent for the project. The Illuminating Company, along with the contractor and authorized agent for the project, shall resolve the field conflicts and determine if there are associated compensable costs. The Illuminating Company will not accept contractor delay costs that the Company has not had opportunity to dispute or resolve.

Work Week

The Illuminating Company's workweek is comprised of 5 days per week, 8 hours per day, Monday through Friday. Any overtime costs incurred, as a result of contractor project escalation or requests from ODOT, Cuyahoga County or other project administering agencies shall be billed directly to the contractor. Authorization for payment for the requested overtime shall be received in advance of the overtime being worked.

OSHA Clearances

For the purposes of 29 CFR 1926 Subpart CC, the electric distribution facilities are energized at less than 50,000-Volts. All contractors/owners must know & comply with Occupational Safety Health Administration (OSHA) safe-working clearances between persons or any conductive object and energized bare wires.

Manholes

The Illuminating Company denies permission to any contractor or other utility to remove Illuminating Company manhole castings, cut down Illuminating Company manhole necks, and to temporarily plate over project-created Illuminating Company manhole roof openings. This practice often results in construction debris falling into manholes, thus damaging energized circuits. Under any circumstances if project construction debris is found in Illuminating Company manholes on the subject project, the Illuminating Company shall charge the responsible party for the required clean out. In the event circuitry is damaged as a direct result of project construction debris, the Illuminating Company shall also file a claim, and pursue reimbursement for the damage. It is the Project General Contractor responsibility to notify the Illuminating Company in advance of any existing debris found in Illuminating Company manholes.

Customer Owned Facilities

Customer-owned secondary cables/wire and equipment, including underground, that requires relocation caused by a public works project is not the responsibility of The Illuminating Company. The management, coordination and relocation cost for customer owned facilities generally is the responsibility of the requesting agency. Examples are service to signs, traffic signals, telecom controls, businesses, residences, highway lighting, etc.

Schedule Delay

In the event of a major storm in our service territory, the Illuminating Company's priority becomes the safety of the general public and employees. Efforts are directed to the safe and timely restoration of electrical service to our customers which may affect the projects overall schedule.

The Illuminating Company



John Zassick
Distribution Tech
Northern Region Engineering Services

CC file